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HAND-BOOK
OF
Farm Labour.

BY
JOHN CHALMERS MORTON,

EDITOR OF "THE AGRICULTURAL GAZETTE," "THE AGRICULTURAL CYCLOPEDIA,"
"THE NEW FARMER'S ALMANAC," ETC.

A NEW EDITION.

LONDON AND NEW YORK:
CASSELL, PETTER, AND GALPIN.

1898.



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HAND-BOOK

OF

FARM LABOUR.

THE following pages contain, re-arranged and in completer detail, the materials gathered for two papers, one of which, "On the Cost of Horse-Power," appeared in the nineteenth volume of the Royal Agricultural Society's Journal;* and the other, "On the Forces used in Agriculture," was read before the Society of Arts on the 7th of December, 1859, and immediately appeared in the weekly journal of that society. In addition to such a discussion of the management, the quantity, and cost of hand, horse, and steam power employed on English farms as may thus be possible, details are given of the expense of the different agricultural operations which are performed by means of them; and, founded upon these, the labour-cost is calculated of our different agricultural crops and products. The book was written originally seven years ago, and a new edition of it is supposed to be called for by the general interest which the condition of the agricultural labourer has of late excited. Such additions have accordingly been made to its pages as recent agricultural history and progress have made necessary.

I. STATISTICS OF FARM LABOUR.

It is proposed in this chapter, in the first place, to specify the quantity of hand, horse, and steam power actually employed on a number of known farms, selected so as to be characteristic, as far as possible, of our different soils and our different styles of management; then to compare and contrast these instances, so as to determine how much horse and hand labour is employed per acre in good and average agriculture; and, lastly, to give such tables from the latest returns of the population and their

* Murray.

occupations as throw light upon the whole amount of farm labour in the country.

1. **Labour on Light Soils.**—I give three instances:—
(1.) My first is that of an extremely light-soil farm reclaimed from Sherwood Forest in Nottinghamshire. It varies from a mere sand to a gravelly sand, in many places containing boulders. Its character is indicated by the fact that a day's ploughing is equal to one acre in the case of the deepest work, and $1\frac{1}{2}$ or even two acres in that of light fallow ploughing—the average ploughing of all sorts being about $1\frac{1}{4}$ acres daily, done in eight or nine hours—two horses to a team. The extent of the land under cultivation is 930 acres, all arable: 350 acres are in grain crops; 350 are in one and two years' clover; twenty acres are in pulse crops; and 210 acres are in fallow crops, as turnip, mangold-wurzel, &c. Twenty horses suffice for the cultivation of the land, being one pair to every ninety acres; or, deducting the acreage in clover, one pair for every fifty-six acres of land actually under the plough. Steam power has latterly been employed, not only for threshing out the corn, but for cultivation. The following figures, however, refer to the labour of the farm under horse cultivation.

The average number of persons constantly employed is twenty-four men and eighteen boys. This, however, includes a foreman and a wheelwright. In harvest additional hands are hired for various periods. In July and August some thirty boys are engaged in singling turnips and in weeding. The wages paid during a selected year, deducting the wheelwright, were £1,245 12s. 2d.; in the following year, the wages paid were £1,147 8s. 11d. The extra harvest wages paid amounted, in the two years, to £156 17s. 7d., and £216 13s. 3d. respectively. The average sum annually paid for hand labour amounted thus to £1,383 5s. 11d., or as nearly as possible, 30s. per acre.

(2.) My next two instances are of comparatively light fen land, in the counties of Cambridge and of Lincoln. The following are the particulars given me of a farm near Chatteris. The soil is very light and non-adhesive; a character, however, which it is gradually losing by lapse of time, for many fen farmers break up a good deal of their clean fallow lands with four or six horses to a large plough, bringing up the subsoil, which is clay, and mixing it up with the top soil. They then plough from ten to fourteen inches deep; but the usual depth of ploughing is for wheat five or six inches; and on the higher lands they cultivate from six to eight or nine inches deep. Two horses easily plough

five roods a day on the fen ; on the high lands early in the season two horses will plough from three to four roods per day ; but in winter and spring, when the land gets wet and sticks a good deal, they usually plough with three horses at length, to avoid treading, and they plough just three roods daily.

The farm consists of 900 acres of plough land and 120 acres of pasture : 450 acres are in grain crops ; 150 in clover ; 65 in pulse (beans, peas, &c.) ; and 235 in fallow crops (turnip, mangolds, rape). The horses needed number twenty-nine—one pair for every sixty-two acres of arable land, or, taking clovers out, one pair for every fifty-two acres of actually ploughed land. The hands regularly employed are about thirty men throughout the year, and twenty to thirty women, girls, and boys, from April to November. Of this number, six men during winter, not so many in summer, are employed at piecework. Extra hands are employed for reaping and during harvest time, but at no other period. The wages paid amount to £1,560 a year ; and it is to be taken into account, as affecting the amount of labour, that forty acres of potatoes are grown as one of the fallow crops, and that weeding on fen lands is an expensive item. This amount, deducting 5s. an acre for the pastures, is 34s. per acre on the arable land.

(3.) The following are particulars of another farm, also of fen land, but in which the process of ploughing up the clay subsoil has been carried further, so that the soil is peat upon clay over not more now than one-half of the farm—over the remainder the clay is ploughed up—and it needs a great deal of rolling to give it sufficient solidity for the wheat crop. The ploughing may be reported at $1\frac{1}{4}$ acres daily on the average for each pair of horses. The general depth of cultivation is five inches ; for, though they plough deeper for fallow, yet the peat decomposes, and they lose the depth in the course of a year, and find it prejudicial to any other crop to plough deeper than it was fallowed.

The land is 790 acres in extent, or, deducting roads, and drains, and waste, 760 acres, of which about 100 acres are pasture, 130 are clover, 330 acres grain crops, 90 acres flax and pulse, &c., and 110 acres are fallow crops. Twenty horses are employed—one pair for every sixty acres of arable land, or, deducting clovers, one pair for every fifty-three acres of land actually under the plough. The wages paid for hand labour during the three years, were £1,414, £1,305, and £1,061, averaging £1,260 ; which, deducting 5s. an acre for the pasture land, is 37s. an acre. The number of men during three months from Lady-day averaged

twenty-eight weekly. During August, September, and October, they averaged about twenty-two, independently of which £300 were spent in harvest wages. During the remainder of the year they averaged about twenty. In addition to this, from sixteen up to nearly forty boys and girls, and from eight to twelve women, are employed during the spring and summer months. The whole labour during the three years referred to is represented in the following table, in which the work is given as occupying so many weeks of one man, woman, or child :—

Year.	Number of Weeks of one			Equal to Employment throughout the Year for so many.			Harvest Wages in addition.	Total Wages.		
	Man.	Woman.	Boy or Girl.	Men.	Women	Boys or Girls.		£	s.	d.
1st	1,312	210	651	25	4	12½	£ 300	1,414	14	0
2nd	1,314	147	665	25	3	12½	300	1,304	16	9
3rd	1,164	131	660	22½	2½	12½	245	1,060	16	0
Average	1,263	163	659	24	3	12½	281	1,260	2	3

The use of steam power on these farms is confined to the work of threshing out the grain.

2. Labour on Medium Soils.—(1.) My first instance is that of a small farm, wholly arable, in Gloucestershire. It consists of 260 acres of a soil varying from a light and shallow stony brash over limestone rock to a somewhat clayey loam. There is a fixed steam-engine of about six-horse power, by which all the threshing is done, and seven horses did all the horse work of the farm during the time I knew it; and as all the root crops were carried home, and only one-eighth part of the arable land was in clover, the labour of cultivation was very heavy. This was equal to seventy-four acres of arable land, or about sixty-four acres, deducting the portion in clover, to each pair. I have the labour account of this farm for three years, during which the wages had averaged about £700, varying from £9 and £10 a-week during winter, to £14 and £15 during spring and summer, and £20 to £40 during harvest. Ten men during winter, and thirteen or fourteen in summer, with as many as fourteen or fifteen women and boys during the spring and summer season, and three or four during winter, were con-

stantly employed. The wages were to a great extent paid by the piece : as much as £200 out of £700 were thus paid. On the whole it amounted to nearly 54s. per acre, one of the largest expenditures in ordinary arable farming which I have known. (2.) The following particulars relate to a first-class arable farm in East Lothian :—Its extent is 650 acres ; and it employs twenty-one work horses, or one pair for every sixty-two acres, which, deducting 120 acres of clover, is equal to one for about every fifty acres of land actually under the plough. No fewer than eighty acres are each year in potatoes, which has no doubt considerable influence on the manual labour bill. The following are the hands employed :—One overseer, one shepherd, ten ploughmen ; three—engine-man, barn-man, and overseer of out-workers ; two cattlemen, five hedgers and labourers, and thirty-five lads and women. Besides these, twenty-five or thirty people are employed for three or four weeks at harvest, and ten or twelve women are kept on until the potatoes are secured. Reaping machines have enabled the tenant to dispense with the labour of thirty or forty people during harvest time. The labour of this farm must cost at least £1,200 a-year, or nearly 40s. per acre. (3.) The following relates to a farm in Northumberland of 310 acres arable and 110 acres pasture, most of which is a flat alluvial soil, partly light and partly good deep loam—all good turnip land :—Fallows are ploughed eight to nine inches deep with two horses, and twelve inches with three horses wherever the land allows ; lea land is ploughed four to 6½ inches deep ; turnip land for corn five inches. Eight horses are needed, a pair for every seventy-eight acres of arable land, or, deducting fifty-seven acres of clover, one for every sixty-three acres of ploughed land. On this farm only seven men and nine women are employed regularly, and seven men and seven women for a month extra during harvest. The wages cannot exceed £500 a-year, or about 32s. an acre on the arable land. (4.) On a farm in Oxfordshire of 300 acres, 100 of which are meadow and the remainder gravel, clay, and clay loam, twenty-five acres being in clover, seven horses are employed, being a pair for every fifty-seven acres of arable, or for every fifty of *ploughed* land. The staff of labourers consists of fourteen men, five boys, and four women, all of whom, except the women, who do not turn out in bad weather, are employed throughout the year. All the farm work, harvest included, is done by the regular hands, the land being of such various character as to bring the harvest in at various periods so as to be easily manageable. The

labour bill here must be at least £450 a-year ; or, deducting 5s. an acre for the pastures, upwards of 40s. an acre. (5.) The College farm at Cirencester is described as follows:—260 acres are a useful marl with stones ; the soil deep enough to allow of seven-inch ploughing, and sufficiently retentive to render it stiff working land in moist weather ; 100 acres are of a light and shallower soil, sometimes occupying the slopes of the hills, where there are not more than two or three inches of earth ; forty acres are a strong clay marl. Three horses in line are needed for six to seven-inch ploughing. From one acre (lea ploughing) to three-quarters (in winter) is a day's ploughing. For working these 400 acres arable and forty acres pasture, eleven horses are required, equal to one pair for every seventy-two acres arable, or, deducting 100 acres of clover, for every fifty-four acres of actually *ploughed* land. The labour bill amounts to £700 a-year ; or about 34s. 6d. an acre on the arable part of the farm. The labourers employed are as follows :—Team hands, three men, two young men, one boy ; cattle hands, three men and one boy during four months, three men and three boys during eight months ; day-labourers rather above eight on an average throughout the year ; boys rather more than four ; women rather above four on an average. (6.) Of two large farms near Lechlade, Wiltshire, I have particulars of the labour annually employed. They include no less than 2,000 acres of arable land, and 430 of pasture ; and the following are the hands employed in July and in November respectively :—

					July.	November.
Men and Lads with Teams	...	...	...	...	51	40
Do. Do. „ Sheep	...	...	...	...	8	14
Do. Do. „ Cattle	...	...	...	...	5	11
Do. Labourers	...	...	...	...	53	45
Women	...	...	...	...	61	25

This will represent an average employment of 95 men, 20 boys, and 40 women throughout the year. The labour bill cannot fall short of £3,200 a year, or 32s. an acre on the arable land.

The horses employed on these farms, previous to the adoption of steam power for cultivation, were forty-three in number, with seven teams of oxen. If these oxen be put, as equal to thirteen

horses we shall have twenty-eight pairs to 2,000 acres of arable land, one to every 71 acres, or thereabouts; or, deducting about 500 acres of clover and some fern, a pair to every fifty-three acres of actually ploughed land.

(7.) My last instance under this class of soils is of a farm also on the Cotswold range, and for the most part of shallow brashy soil, consisting of rather more than 400 acres arable, and 280 acres pasture; twelve horses are employed, equal to one pair for every sixty-eight acres arable, or, deducting no less than 174 acres of clover, &c., one pair for only forty acres of actually ploughed land. The hand-work of the farm is done by twenty-three men, seven boys, and ten women, besides extra occasional hands for reaping, turnip-hoeing, and sundries. If we add £75 for this extra harvest work, the labour bill of this farm will probably exceed £750 annually, amounting to 34s. per acre of the arable land, if we deduct for the probable expenditure on the pastures.

3. Labour on Stiff Soils.—It is on these soils especially that steam power is likely to find general employment in the cultivation of the land. It will not, however, displace manual labour, for it will enable the cultivation of a more laborious class of crops—mangold-wurzel, for instance, in place of vetches—enabling thus the keeping of a larger live stock through the year, which will require a proportionally large number of attendants. I have four instances in illustration of the labour of stiff soils, and on most of them the steam plough is at work. (1.) Woolstone Farm in Buckinghamshire, for the most part a heavy soil (112 acres arable land, and seventy acres grass land), employs regularly three horses and a ten-horse power engine, which is employed on an average during fourteen days in ploughing, and during other fourteen days in threshing. Seven men and four boys are employed regularly on this farm, and their wages must amount to at least £250, or, deducting £20 a year for the pastures, £2 2s. per acre per annum. The horse labour on this farm is equal to one pair to every seventy-four acres of arable land, or (deducting twelve acres in clover) to every sixty-six acres of actually ploughed land. (2.) On a farm of 590 acres of arable land, sixty-five acres of water-meadow, and 160 acres of down-land, in Wiltshire, the labour bill amounts to about £1,170 a year, which, deducting for pasture-land, is about 38s. an acre. This pays for thirty-one men, seventeen boys, and fourteen women and girls. The horse labour on this farm is done by sixteen large cart-horses, and twenty-two ponies, the latter being worked three or four in a plough, and

reckoning them at their comparative value with ordinary cart horses, the whole may be considered equal in force to about twenty-eight of the latter. Of the 590 arable acres, 120 are in clover or other artificial grass; 120 are in roots or other summer and autumn food; and 350 acres are in corn, including turnip seed. (3.) On a clay land farm of 520 acres arable, and 200 acres pasture, there are employed, with slight variations, thirty men, seven women, and twelve boys, throughout the year, with seventy additional men for three weeks during harvest time. Twenty-four horses were employed, which was a pair for every forty-three acres of the arable land, until steam power was employed in cultivation. Since then, one-third (eight) less are needed from the termination of wheat sowing till the commencement of harvest; but the other part of the year (*i.e.* during harvest and during autumn cultivation of which, even with the aid of steam, enough cannot be done) gives work for as many horses as ever; so the difficulty is met in this way—four horses are parted with, and from the others four to six colts are annually bred, the foals are weaned early, and the mares are brought to work again just when they are wanted. The labour of the farm, calculated at ordinary wages, must cost £1,200 a year, which, after deducting for the pasture-land, is at least £2 4s. per acre. (4.) My fourth instance is of land near Farringdon, of which one-half is pasture, and the whole is a dairy farm. It is 600 acres in extent, and 150 cows are milked, which of itself requires fifteen constant hands. The whole hand labour of the farm costs nearly £800 a year, and is done by the following hands upon the average—twenty-two men, eight women, ten boys. Deducting for the pasture, the labour of the farm amounts to at least 46s. an acre over the arable land. An engine is used for threshing and cutting chaff for cattle, and grinding food for pigs; and a set of Fowler's steam-ploughing tackle is also found to answer exceedingly well in the cultivation of the land.

4. Average Quantity of Labour Employed.—Let us in the first place tabulate and compare the results already obtained.

The reader may be left to extract for himself what information the table can convey. It will, however, be right to say, that our first instance of a medium-soil farm must be considered as altogether exceptional; a very unusual proportion of the land was in laborious fallow crop, and not only was the quantity of hand labour unusually large, but the quantity of horse labour was *unusually small*. Taking those cases, of which the full particulars

No.	Extent in Acres.				Horses worked.	Hand Labour.			Annual Labour Bill.	Wages per Acre of Arable, Deducting ss. for Pasture.	Acres to each Pair of Horses.			
	Fallow Crops.	Arable Grain.	Clover.	Pasture.		Men.	Women	Boys and Girls.			Arable Land.	Ploughed Land.	Fallow Crops.	
Light Soils.	1	210	350	350	15	20	28	—	22	1383	5. d.	90	56	20
	2	235	515	150	120	29	30	12	15	1560	34 0	62	52	16
	3	110	420	130	100	20	33	3	13	1260	37 0	66	53	11
Medium Soils.	1	70	160	30	—	7	12	8	4	700	54 0	74	64	20
	2	430	—	120	—	21	26	20	15	1200?	40 0	62	30	16?
	3	78	175	57	110	8	8	10	—	500?	32 0	78	63	19
Heavy Soils.	1	50	125	25	100	7	14	4	5	450?	40 0	57	30	14
	2	91	224	85	40	11	16	4	8	700	34 6	72	54	16
	3	566	946	492	430	56	95	40	20	3200?	32 0	71	53	10
Heavy Soils.	1	60	174	174	280	12	25	12	8	750?	34 0	68	40	10
	2	20	80	12	70	3	7	—	4	250?	42 0	74*	16	14
	3	120	350	120	225	28	31	14	17	1170	38 0	42	33	9
Heavy Soils.	1	120	280	120	200	20	34	7	12	1200?	44 0	52*	40	12
	2	300	—	—	—	22	8	10	800	46 0	—	—	—	—

On the farms marked thus * much of the cultivation is done by the Steam Plough.

are given—viz., thirteen out of the fourteen farms described—we have the following gross results :—On 7,824 acres of arable land,

and 1,690 of pasture, 242 horses are employed, and work is given to 359 men, 134 women, and 143 boys and girls, costing, on the whole, not less than £14,323. This, if we deduct £423 for the pastures, is equal to about 33s. per acre of arable land. The horse labour of these farms amounts, on the average, to one pair for every sixty-five acres of arable land, or for every forty-nine acres of actually ploughed land.

It will be observed that more than the average wages are paid for manual labour on those farms where steam power is employed as an auxiliary force. The interests of the labourer will be considered more fully in a subsequent chapter, and the possibility of his suffering by the employment of a cheaper force and more powerful machinery will be discussed. Meanwhile it is a fact, that on those farms of which the details are known, where steam power is employed for cultivation, the wages paid for manual labour exceed the average. And if it be alleged that this is a consequence of the stiffer nature of the soil in those cases, the rejoinder is, that this intractability of soil has hitherto resulted in such land being kept in pasture, or, when cultivated, being devoted only to such crops as grain, vetches, clovers, which involve the least manual labour in their cultivation, whereas, where steam power is available for cultivation, our clays, retaining their superior fertility, are made available for all kinds of fallow, labour-giving crops, such as mangold-wurzel, kohl rabi, cabbages, and other winter food for sheep and cattle.

And there is, thus, extra labour needed not only in their cultivation, but also in tendance of the live stock needed for the consumption of their produce.

It must be remembered by any who would apply these results over any great extent of country, in order to ascertain the quantity of our agricultural labour, that the farms quoted are much above the average, whether as regards the intelligence, the enterprise, or the wealth of their occupants; and, therefore, no doubt much above the average as regards the force employed in their cultivation. Probably a more useful set of averages for statistical purposes exists in certain results which I obtained some years ago by an agricultural survey of south Gloucestershire. That county, and especially that section of the county, is remarkable for an extremely various geology. The extent of the several geological districts which it comprises was estimated and ascertained (after *they had been laid down on the ordnance map*) by scale and *compasses*; the extent of pasture land in each was estimated on

data obtained by careful observation ; the quantity under the several crops was calculated by applying the common rotation of each district to the extent of arable land within it. The average produce of these crops was judged of by many seasons' observation, and some experience ; the total value of agricultural produce was thus obtained, and its value per acre was divided, according to the best judgment that could be formed, amongst the three parties interested in it, viz., the Landlord, Labourer, and Farmer. The following are the results arrived at :—

AGRICULTURAL STATISTICS OF SOUTH GLOUCESTERSHIRE.

No.	Soil of the Several Districts.	Per Centage of Arable Land.	Value of Gross Produce per Acre.	Rent.	Labour.	Profit.
			£ s. d.	£ s. d.	£ s. d.	£ s. d.
1	Clay-loam	3	3 13 0	2 6 0	0 12 6	0 14 6
2	Stiff clay.....	4	2 4 0	1 0 0	0 12 0	0 12 0
3	Marl and loam	14	3 0 0	1 8 0	0 18 0	0 14 0
4	Medium	17	3 12 0	1 10 0	1 6 0	0 16 0
*5	Rich loam	30	*4 17 0	*1 18 0	*2 4 0	0 15 0
6	Poor clay	37	3 3 0	0 18 0	1 12 0	0 13 0
7	Brashy soil	42	3 16 6	1 5 0	1 15 6	0 16 0
8	Light gravel ...	50	3 13 0	1 16 0	1 1 0	0 16 0
9	Light soil	50	3 1 0	1 6 0	1 1 0	0 14 0
10	Ditto	60	4 0 0	1 10 0	1 13 6	0 16 0
11	Thin brash	86	3 18 0	1 17 0	1 17 0	0 14 0
12	Light soil	100	4 12 0	1 12 0	2 5 0	0 15 0

It must be remembered that the labour column includes the whole cost of cultivation—horse labour as well as manual labour—and the amount paid in wages is therefore to be sought by deducting from the sums specified in that column such a number of shillings per acre as the horse labour may be estimated at. I do not name the districts, or give their geological character or position ; they are arranged in the order of the proportion of arable land which they are believed to contain.

If, now, the horse labour be taken at 20s. an acre where the land is wholly arable, and reduced to 10s. where 50 per cent. of the land is arable, and to 5s. or 6s. an acre or thereabouts where it is wholly pasture, the wages paid per acre in south Gloucestershire will vary from 6s. 6d. per acre to as much as 25s. an acre

* A great deal of potato cultivation prevails.

on the richest and most arable soil ; amounting in all to probably not more than 21s. an acre over the whole district, and to not more than 24s. or 25s. over the arable land of the district. This is, however, considerably under the average of the farms, whose particulars have been given.

5. National Statistics relating to Agricultural Labour.—Premising that of the whole population of England and Wales (20,066,234 in 1861), about 25 per cent., or probably rather less, may be stated to be engaged in agriculture, I quote from the census table of 1861 the following table of the numbers engaged in the several departments of farm work :—

EMPLOYMENTS OF THE AGRICULTURAL CLASS IN 1861.

1861.	Males.	Females.
<i>a. IN FIELDS AND PASTURES.</i>		
Proprietors	15,131	15,635
Farmers }	226,957	22,778
Graziers }	—	163,765
Farmers' and graziers' wives	92,321	83,830
Farmers' sons, daughters, &c.	15,698	—
Farm bailiffs	914,306	43,964
Agricultural labourers (out-door)	25,559	—
Shepherds	158,401	46,561
Farm servants (in-door)	4,702	—
Land surveyors }	490	—
Land agents }	33	—
Agricultural students	35	—
Hop growers	81	—
Willow growers	236	—
Teazle growers	1,205	—
Agricultural implement proprietors	1,761	—
„ „ workers	91	—
Drainage service	73	44
Colonial farmers		
Others		
<i>b. IN WOODS.</i>		
Woodmen	8,907	—
Others	10	9
<i>c. IN GARDENS.</i>		
Gardeners	76,700	1,773
Nurserymen	2,838	79
Watercress growers	55	—
Others	22	5

Statistics of Farm Labour.

13.

I have given the whole series of figures characteristic of the agricultural class, notwithstanding that many items in these columns have no relation to the agricultural labourer. The principal items are those of in-door servants, and out-door farm servants and shepherds, and I repeat them, dividing them into columns determining their ages.

Labourers	Total.	Under 20 Years Old.		Over 20 Years Old.	
		Males.	Females.	Males.	Females.
Out-door	1,077,627	198,226	14,826	808,502	56,072
In-door	364,194	126,491	64,713	109,452	63,538
Shepherds	19,075	2,990	—	16,085	—
Total	1,460,896	327,707	79,539	934,039	119,610

NUMBER OF LABOURERS EMPLOYED ON FARMS OF VARIOUS SIZES.

1. Number of Labourers employed by each Farmer.	2. Number of Farmers employing the Labourers in Column 1.	3. Number of Labourers employed by the Farmers in Column 2.
0	91,698	—
1	33,564	33,564
2	27,949	55,898
3	17,348	52,044
4	14,109	56,436
5	7,622	38,110
6	6,449	38,694
7	3,849	26,943
8	3,806	30,448
9	2,423	21,807
10	8,632	107,900
15	3,221	56,367
20	2,073	46,642
25	850	23,375
30	721	23,433
35	256	9,600
40	275	11,687
45	106	5,035
50	132	6,930
55	65	3,738
60 and upwards.	170	17,000
Total	225,318	665,651

The foregoing table, illustrative of the varying numbers of labourers employed on farms of different sizes, has been given, though it is taken from the census of 1851, because it still, in all probability, nearly represents the truth. The table states that 91,698 farmers made no return of the number of labourers on their farms. In the majority of such cases it may be assumed that no labourers were employed by them; that number of small farms being worked by the occupants alone. The Table reads thus:—7,622 farmers employ five labourers apiece, or 38,110 labourers in the aggregate, and so on.

To this another table may be added, in which a return is given of the number of farms of various sizes in England, Scotland, and Ireland respectively. The return for Ireland is dated 1861, and those for England, Scotland, and Ireland date from so long ago as 1857, when the agricultural statistics of Scotland were last collected by the Highland and Agricultural Society.

SIZE OF FARMS AS INDICATING OCCASION FOR AGRICULTURAL LABOUR.

Size of Farms.	Ireland.	England and Wales.	Scotland.	Islands.
Under 5 Acres.	127,030			
5 to 15 "	183,931			
15 " 30 "	141,251			
30 " 50 "	72,449			
50 " 100 "	53,930			
Under 100 "	578,591	142,358	44,469	3,746
100 to 200 "	21,531	45,752	7,009	151
200 " 300 "		18,401	2,166	36
300 " 400 "	8,329	8,061	961	9
400 " 500 "		3,585	471	7
500 " 600 "		1,971	272	5
600 " 1,000 "	1,591	2,372	442	2
1,000 and upwards		771	360	1
Total	610,045	223,271	56,150	3,957

In the above table most of the smaller holdings in Great Britain are omitted. Their number in Ireland will, no doubt, ultimately diminish by the prevalence of a better agriculture, and the consequent union of small farms—the smaller tenantry earning

a better livelihood as labourers. Two-thirds of the farms in Great Britain at the date in question were under 100 acres; or, taking the exact proportion—in 1,000 farms 672 were under 100 acres, 187 were between that and 200 acres, 137 were 200 and under 1,000, and four were 1,000 acres and upwards. The proportions to 1,000, farms in England and Wales were 638 under 100 acres, 205 of 100 and under 200 acres, 154 of 200 and under 1,000 acres, and three of 1,000 acres and upwards. In Scotland there were 360 farms, and in England 771 of 1,000 acres and upwards; and there were 142,358 farms in England, and 44,469 farms in Scotland, each of which is under 100 acres. In England and Wales the large holdings abound in the south-eastern and eastern counties; the small farms in the north midland counties, in Yorkshire, in Wales, and in the north-western counties, comprising Lancashire and Cheshire.

6. Agricultural Statistics as indicating Employment of Labourers in Agriculture.—The following figures give the latest agricultural statistics (1867). They are confined to such particulars as may illustrate the subject of farm labour, giving the acreage of corn and green crops and of grass respectively, in the several divisions of the country :—

	England.	Wales.	Scotland.	Ireland.	Total for United Kingdom.*
Total Population	20,276,494	1,187,103	3,136,057	5,571,971	30,315,072
Total Area (in Statute Acres)	32,590,397	4,734,486	19,639,377	20,322,641	77,513,585
Abstract of Acreage :—					
Under all kinds of Crops, bare fallow, and Grass	22,032,356	2,519,170	4,379,552	15,542,208†	45,491,097
Under Corn Crops	7,399,347	521,404	1,364,029	2,115,137	11,431,940
Green Crops	2,691,734	138,387	668,042	1,432,252	4,951,796
Bare Fallow	753,210	86,257	83,091	26,191	953,998
Grass—Clover, &c., under rotation ...	2,478,117	300,756	1,211,101	1,658,451	5,679,433
Permanent Pasture, not broken up in rotation† ...	9,545,675	1,472,359	1,053,285	10,057,072	22,156,541
Abstract of Live Stock returned :—					
Total Number of Cattle ...	3,469,026	544,538	979,470	3,702,378	8,731,473
" of Sheep ...	19,798,337	2,227,161	6,893,603	4,826,015	33,817,951
" of Pigs ...	2,548,755	229,917	188,307	1,233,893	4,221,100

* Including Islands.

† Exclusive of heath or mountain land.

‡ Including under Flax, 253,105 acres.

In addition to these figures I add the number of horses given in the latest returns open to us—viz., In England (1854), 1,309,010; in Scotland (1857), 185,409; and in Ireland (1867), 322,348.

Now, excluding the Irish returns, we have nearly 18,000,000 acres under arable culture, and probably 12,000,000 in permanent pasture. If there be a pair of horses for every fifty acres of plough land in the country, employment is at once provided for 720,000 horses, leaving about 770,000 unaccounted for, a number which, including colts and young animals, is not greater than are no doubt used as hacks, carriage horses, and in commercial traffic. Suppose, again, that the wages of agricultural labourers amounted to 28s. an acre on the arable land, and 7s. 6d. an acre on the pasture, which is midway of the instances already quoted: we then have an agricultural labour bill of nearly £30,000,000. Now there are 824,587 labouring men engaged in out-door work in English agriculture, and supposing them to earn 11s. a week apiece throughout the year, their wages will cost £24,583,187. There are 56,072 female agricultural labourers, and if they work about half the year at 5s. a week, they will earn about £7 each, or £392,504. There are 201,216 boys and 14,826 girls set down as agricultural labourers; if half of them are constantly employed at 5s. a week throughout the year, they will cost about £1,400,000. And these sums amount to upwards of £26,000,000. But there are large numbers of in-door servants put down as farm servants. 109,452 men, 63,538 women; 364,194 boys, and 126,491 girls are thus put down. A large part of this number are probably domestic servants; if the men, however, be taken as agricultural labourers, they, at 11s. a week will cost upwards of £3,000,000, and a large proportion of the boys will be paid for by another million, which, with the £26,000,000 already accounted for, just makes up the £30,000,000, at which, according to the estimated agricultural acreage of Great Britain, the manual labour of cultivation will amount to at the rate of £1 8s. per acre of the arable land, and 7s. 6d. an acre of the pasture. These, therefore, may be considered fair estimates of the annual expenditure per acre on agricultural labour in this country.

The information given in this chapter is related somewhat unconnectedly. Its estimates and facts are stated individually and separately; and the reader is left to choose those of them for his instruction or his guidance whose circumstances may most nearly resemble his own. Some further attempt will be made in the succeeding chapters on steam, and horse, and hand power

respectively, to justify the estimates already made of the quantity of each already used in English agriculture, as well as to indicate such alterations in the quantity and quality of each as will probably arise in farm practice as time goes on.

II. STEAM—WATER—WIND.

THE reader must be referred to other works* for information about those points in the relations of water to heat on which the theory of steam power depends, as well as for those details of the construction of steam engines which have been devised in order most fully to realise in practice all that theory points out as possible in the economy of fuel and in the production of force.

He must also consult works on hydraulics,* both theoretical and practical, for such instruction as will enable any one to turn a water supply to account, by means of water-wheel or turbine, in the production of power. The present chapter will be confined to general remarks on the availability of these powers for agricultural purposes; on their ordinary cost per horse power under given circumstances; and on the economical use and management of each.

7. The Agricultural Uses of Steam Power.—It has long been used for grinding corn, cutting chaff, and threshing grain; latterly it has come, and every year with increasing rapidity it is now coming, into use for cultivating the soil.

There are three classes under which all the operations of the farm may be arranged, and they correspond exactly to the three principal forces which we have at our command.

In the first, where the greatest uniformity of process obtains, the greatest power is needed, and a purely mechanical force acting through levers, wheels, and pulleys, is in this way sufficiently under our control for their performance, and this class of operations increases in extent and in importance with almost every permanent improvement of the land, *i. e.*, with everything which tends to the uniformity of its condition. In the second class as much force is needed; but rocky subsoil, awkward hedgerows, crooked roads, and scattered produce interfere with

* For instance, to *The Engineers' Assistant*, published by Blackie and Son, Glasgow.

any possibility of uniform procedure. Some machinery, more pliable than cranks and rods, is needed by which to carry out the purpose of the mind, and here, therefore, it must work by means of the *teachable* and powerful horse. This class of operations diminishes in extent and importance with every permanent improvement of the soil, *i.e.*, with every removal of those obstacles to which I have referred. In the third class the care and cultivation of individual life, vegetable and animal, are concerned: no great power is needed, but there is need for the constant and immediate exercise of the will, varying, it may be, at every successive moment; and here, therefore, the human mind can work only by its most perfect instrument—the human hand. It is plain that everything by which on the one hand land is brought to a uniform condition, and by which, on the other, the quantity of its living produce is increased, will extend the first and last of these three fields of agricultural operations, and will diminish the necessity of employing horses.

And this is no mere speculation; it is the principal lesson of the agricultural experience of the past few years. If we knew for several successive years exactly the employment of our agricultural labourers (its nature, its quantity, and its reward) on each of the farms which make up the surface of Great Britain; and if we also knew the quantity and the manner, during all these years, of the horse labour of all these farms, its cost per acre and its effect; and if in addition to all this information we had the full experience, now very considerable, of the use of steam power upon the farm, not only for threshing and grinding and cutting, but for cultivating the soil, we should certainly learn from it how rapid has been the extension of those circumstances under which steam cultivation becomes possible. It is, indeed, more especially in the application of steam power to cultivation, that the great interest taken in its agricultural usage centres now. For this purpose it has special advantages over the horse, which may be named at once.

I refer first to the injury done to the land by the trampling of draught animals; and secondly, to that irregularity of employment on the farm for horses during the year, which in effect makes it necessary to keep upon a large farm several horses all round the year for the sake of their work during a few weeks of spring and autumn. If a steam engine, which costs nothing when it is idle, can be used to take this extra work, and so reduce the horse labour of the farm to an uniform monthly amount, then its cost

has to be compared, not with that of the horses which it has displaced during the few weeks in question, but with the cost of those horses throughout the year. It is this fitness of the engine for the cultivation of our stubbles in autumn, and so its power to displace so many teams throughout the year which would otherwise be kept just for the few weeks of most laborious time, that greatly heightens the economy of its employment.

It is, of course, on large farms, where three or four pairs of horses may be dispensed with without incurring any difficulty at harvest-time that steam power is most applicable; but even on small farms of clay-land the superiority of the tillage done by steam is so great that the advantage is cheaply bought, though a considerable additional annual charge is thereby incurred. It is on heavy soils, moreover, that the expense of horse labour—which the substituted steam must on farms of any size to a considerable extent displace—is greatest. Large teams must on such land be kept all the year round for the sake of their work during those few months of the year when they can be allowed upon the land; during which, moreover, there are days and weeks when, urged by the lapse of the season, the farmer permits his teams to work in unfit or barely fit conditions of the land. A power for tillage which will use more rapidly than horses the seasons of fitness; which will, moreover, unlike horses, work the land without treading on it; and, unlike horses, will incur no cost when not at work, must and does exhibit its greatest superiority on clay-land.

In a standard work on "The Valuation of Rents and Tillages" (Bayldon), the cost of the first year of the course of clay-land cropping is estimated thus:—

	£	s.	d.
First ploughing in winter	0	10	0
Second ploughing in spring	0	9	0
Harrowings, &c.	0	5	3
Third ploughing with harrowings	0	14	0
Fourth ploughing with the manure	0	8	0
Fifth ploughing	0	8	0
Seed furrow (8s.), &c.	0	12	9

This is the tillage pursued in bare-fallowing clay-land under ordinary horse cultivation. It is plain that six ploughings by a team of three horses, with a probability, almost certainty, that some at least of these operations will be driven into a time when such land is in unfit condition for cultivation, must be a most

costly and inefficient tillage. Every time that such a team has crossed the field something like two tons (man and tool and horses) have slid and tramped from one end of the land to the other; and in ploughing, this has been done once to every ten or twelve inches in width. Of course, this must harden the ground; and to any one who, without a practical knowledge of farming operations, merely reasons from the natural tendencies of things, it must appear the most clumsy and unlikely process for attaining tilth.

"What," might not such an one ask of the clay-land farmer, "is the object of those long teams of cattle that I see traversing your fields all through the summer, going to and fro twice for about every yard in width of the field they traverse? Are you aiming at the hardening and consolidation of the land?" "Certainly not," is the reply; we are ploughing the land, lifting the soil, exposing a fresh surface to the sun and air. What we aim at by these means is to mix and lighten up the layer of earth in which we place manure for the growth of plants; to soften and reduce it so that the seeds we sow there may be covered, each of them, by moistened particles smaller than itself; to feed and mellow it, so that the young plants shall spread their roots abroad without difficulty, and find the food they need." "Well! but," may not the answer be?—"these teams, with the men and boys and tools belonging to them, weigh 40 cwts. apiece, and to take those 40 cwts. tramping and sliding along every ten-inch width of the soil you want to 'lighten up' and 'soften' is an odd way of aiming at such an end, is it not?" The answer which is given to this is not satisfactory. "We well know," it is replied, "that there is nothing like treading with teams of horses or of oxen for hardening the ground. Indeed, when the land is loose about the young wheat-plant, it is, in some districts, in the early spring, a common practice to adopt that mode of hardening it; but in ploughing they walk in the furrow, and the tool, too, slides along in their wake *below* the layer of earth we move, which, therefore, may be lifted, broken, and loosened, untrdden, notwithstanding we are forced to use a team and a tool which must harden what they tread upon." This answer does not satisfy the querist, neither ought it to do so. It presumes upon a distinction between soil and subsoil which does not naturally exist, but is the result of the artificial treatment of both in common horse-tillage. The creation of a hardened floor beneath the former and above the *latter*, which in great measure cuts off the connection between the

two, is a real injury to fertility; and the destruction of this pan or indurated layer by steam power is one of the greatest benefits of steam-cultivation. The thorough drainage of clay soils is thus enabled; the material of the subsoil is thus added to the scanty supplies of the shallow layer which has hitherto fed our crops; the whole warehouse and machinery by which the work of plant-feeding has hitherto been accomplished is enlarged and energised, and an immense increase of fertility has been obtained. This is no mere theory or speculation; it has been realised in many instances, and realised in its most striking examples at a diminished cost. In place of six ploughings, by which horse tillage achieves its imperfect result, a single thorough smashing up, before winter, of land which has been well cleaned after harvest, is all that well-drained clay-land needs. I certainly do not assert this as a rule without exception; but of calcareous clays, at any rate, it may be asserted that, once drained and cleaned, a smashing up in dry weather before winter is better than a series of ploughings in the spring and early summer. This rough cultivation, followed by a winter's frost, is all that such land needs beyond the mere surface-preparation of the seed-bed in the spring, and that is work for the cultivator and the harrow. Mr. John Fowler said truly on this point, at a discussion before the London Farmers' Club, that a comparison of the cost of the one operation by steam power with that of a corresponding operation by horse power was most inadequate; that one steam-cultivation was equivalent not to one, but to a whole series of operations by horse power; and this not only for its tillage effects, but for its efficiency in the destruction of weeds. "When horses go a second time over the land, they plant as much couch in it as they plough out of it, so that it is impossible to clean land so thoroughly by horses as by steam."

It is, however, to its effect in producing tilth that one chiefly looks as the great result of steam cultivation. There is, as was stated in the paper read on the occasion just referred to, abundance of plant-food down below the level to which horse tillage extends; and so it must, of course, be conceded there is plenty of it below even the level—though that is much deeper—to which steam tillage extends. The main difference between the two lies not in the greater depth to which so great a power as steam can work the land, though that is a most important consideration, but in the fact that horses trampling in the furrow along which the tool they draw has gone, do harden a layer of earth above the

storage which is in their case thus cut off; and this makes the access both of the air which would fertilise this mass of earth below it, and of the roots which would then feed upon the material thus fitted for their food, less practicable and easy. In steam tillage, where the power stands off the ground, and is conveyed by a long rope to the tool—where the tool itself is carried on large wheels—this mischief, whether it be poaching the ground which is thus moved, or hardening a floor immediately below it over the earth which is not being moved, altogether disappears. And it is not too much to say that a clay soil deeply drained, and then deeply stirred and cultivated in dry weather by steam power, is in altogether different circumstances from any which before all this it had ever experienced.

The availability of steam power for the deepest cultivation, and its applicability at the same time to the thorough cultivation of any depth to which it may be desired to stir or turn the soil, without any pressure on it except by the wheels of the implement employed, must ultimately obtain for it the preference over horses for all mere ploughing and stirring, especially of clay-land. And a very large share of the horse labour of ordinary agriculture will thus be handed over to the steam engine.

In order to ascertain how much, let me first say that all the draught labour of the farm may, it is evident, be easily considered as so much weight drawn as if over a pulley (*i.e.* lifted) so many feet in a given time. Thus, the power exerted by a horse is assumed, on the authority of experiment, equal to the pull or lift of 33,000 lbs. one foot per minute; and to this agricultural experience agrees, for if a pair of horses draw a plough along with an average pull of 300 lbs. at an average rate of $2\frac{1}{2}$ miles an hour, *i.e.* of 220 feet per minute, it is the same as if those 300 lbs. were pulled over a pulley, *i.e.* lifted that height in that time; and 300 lbs. lifted 220 feet per minute are just the same as 66,000 lbs. lifted one foot high per minute, which, as the performance of a pair of horses, is exactly the 33,000 lbs. apiece at which their force is valued by the engineer.

Now, I have had described to me the cultivation of certain farms in such detail that all the ploughing, scarifying, harrowing, rolling, horse hoeing, carting, &c.—all the horse labour, in fact—on each has been capable of conversion in this way into weight lifted a certain height in the course of the year. Reference will be made to these farms in more detail in the chapter on horse power; but I will now select three of them in illustration of the

assertion that a very large share of the horse labour of the farm may be done by steam power.

(1.) On a farm of 675 acres, occupied by Mr. Melvin, at Bonnington, near Ratho, in Mid-Lothian, the whole horse labour of cultivation and carriage being converted, as I have already said, into weight, amounts to upwards of 100,000 cwt. pulled, *i.e.* lifted, one mile per annum. Of this the ploughing and scarifying alone amount to 27,000 cwts., or more than one quarter; the harrowing, rolling, and drill cultivation amount to upwards of 20,000 cwts., and the carriage of dung and crops and produce amounts to 60,000 cwts. lifted one mile. The carriage is here an enormous proportion—more than one-half of the whole horse labour of the farm, and much beyond its average amount in ordinary experience; but still even here one-quarter of the horse labour goes in mere ploughing, which can all be done by steam power, and so done as that an eight-horse power engine shall displace more than eight horses, and do their work much more effectually.

(2.) Again, on a farm of fen-land of 790 acres, occupied by Mr. Aitken, near Spalding, Lincolnshire, where the horse labour of the farm is nearly the same as in the last instance, or equal to 100,000 cwts. lifted one mile per annum, the carriage does not exceed much more than one-quarter of the whole, while the ploughing is nearly 40,000 cwts., four-tenths of the whole labour, and the harrowing and rolling about 35,000 cwts. per annum.

(3.) On Lord Ducie's farm, 260 acres, at Whitfield, Gloucestershire, the horse labour amounted to 37,600 cwts. lifted one mile per annum, and of this, 12,000, one third, was carriage; nearly 15,000, or four-tenths, was ploughing and cultivating; and the remainder harrowing, rolling, and drill culture. This seems to be a pretty ordinary division of the labour, and if it applies generally to arable land, it would appear that though farm carriage and all the lighter work of harrowing, and drilling, and rolling continue to be done by horses, there are still four-tenths of the horse labour of the farm which may be done by steam. It appears, then, that on arable land two-fifths of the horse labour of the farm can be handed over to a power which is capable of a very much larger duty at the same expense.

And there is a special advantage connected with the substitution of the cheaper power for that of horses; viz., that the horse labour thus displaced is taken from the most laborious periods of the year—those of spring and autumn cultivation. On examining

the horse labour of a farm of 240 acres of arable land under the alternate husbandry, it will be found that it does not much exceed 500 days of a pair of horses in the year, and that the need for it is distributed among the months extremely unevenly. Not more than thirty-five days of a team per month are wanted in December, January, and February; about forty-five days a month are wanted in March, April, May, and June; about fifteen days are wanted in July; about sixty in August, and ninety in September, and fifty-five in October and November. August and September stand highest, and as there are not generally more than twenty-four working days in each of these two months, there must be a provision of at least three and a half pair of horses all the year, in order that the work of August and September may be done. Now, the two-fifths of the horse labour, which is proper for steam power, if so accomplished, will not merely displace two-fifths of these seven horses through the year; for the ploughing and cultivating which are to be done by steam, constitute not two-fifths, but more than half of the labour of the encumbered months of March, April, and May, and August, September, and October; and if this be done by steam, the quantity of farm labour left will amount to little more than thirty-five days' work during each month of the year, which two pairs of horses will more than easily accomplish.

I believe then that by steam power, as applied to the more regular operations of cultivation, at least three out of every seven horses on arable land may be dispensed with all the year, and their work may be done for less than the cost of these horses during the three or four months when alone they are really needed on the land. And there can be but little doubt that this first class of operations upon the farm, which includes the ploughing and turning of the soil, will ultimately be taken by steam power out of the field of horse labour, just as threshing, and cutting, and grinding have been taken by it out of the field of hand labour.

To the second division of farm work I shall refer but very shortly. It includes such cases of ploughing and cultivation as are taken by rocky subsoil and crooked hedgerows out of the scope of the steam-driven plough; it also includes the lighter class of horse work, such as harrowing and horse hoeing, which, however, might very well be done by steam; and it more especially includes the work of carriage, which, considering the scattered position of the produce to be collected, and the crooked roads along which it must be drawn, I see no probability, so long

as these remain, of getting done except by horse power and manual labour in the usual way.

The third class of operations includes the lighter work of the farm, and attendance upon living things, requiring skill and thought as well as labour. The planting of a seed equidistantly upon the land may be done by machinery, but the culture of the young plant, much of the hoeing of the land immediately around it, and its treatment during growth according to its condition must be left to the hand. When ripe it may be harvested by horse-drawn implements—our corn crops are reaped, our potatoes may be dug, and roots are cut from the ground by horse-drawn machines—they must, however, be gathered into bundles or to heaps, and ultimately removed by the help of manual labour. When stored they are threshed, and ground, and cut, and steamed by steam-driven engines, but they must be administered as food by manual labour. Leaving the vegetable, which even when living may be treated to some extent by machinery, and when no longer growing becomes at once the subject of steam-driven processes, we come to the treatment of the animal which it feeds, and here we leave altogether the region of machinery actuated by steam, and are confined to the hand directed by intelligence.

Is it not a remarkable thing, however, that agriculture, which was once wholly the work of men's hands, but which has long since given up the tillage of the soil, and the carriage of the manure, and the sowing of the seed, and three-fourths of the hoeing of the crops to be accomplished by the horse—which has latterly given up the threshing of the grain and the cutting of its straw to be effected by steam power—which is rapidly abandoning the work of reaping to the former, and of cultivation to the latter, should nevertheless require more labourers than ever?

The explanation lies in this: that agriculture is more and more becoming the work of intelligence and skill as well as power: those parts of its processes, where intelligence and skill are wanted are becoming a larger portion of the whole. Cultivation is more perfectly performed, and over a greater extent of land; the crops cultivated are more laborious and more productive; the stock consuming them is proportionably larger and needs proportional attendance. Probably each acre cultivated in 1768 employed more manual labour in its cultivation than each acre cultivated now; but how many more acres are there under cultivation now than then? Each bushel of wheat grown half a century ago involved so much more labour than that 8s. was the lowest price at which it could be grown with profit; but how

many more bushels per acre does land upon an average yield at present? Each pound of beef and mutton cost more in wages thirty years ago than now; but we have a double and triple store of food for stock, we have two crops of fattened sheep and cattle where formerly we had one, and each supplies a double quantity of meat.

But whatever the explanation be, the fact is certain, that the use of steam power on a farm is part of that system which employs most labourers in agriculture. This is indeed sufficiently illustrated by the table given on page 11, and further reference to it will be made in the section on hand labour.

8. The Cost of Steam Power per Horse Power per Hour.—In order to a comparison of horse power with that of steam, it is necessary to know what each costs for a given amount of force per hour. Steam power, when provided by the most economical furnace, boiler, and engine, as in Cornwall where fuel is very costly, is extremely cheap.

The Appold pump, at Whittlesea Mere, drains upwards of 500 acres of land at a cost of about £150, including coals, repairs of engine, engineman's wages, oil, &c. The quantity of water raised is 16,000 gallons, lifted six feet high per minute. The engine works about three days a week, and runs four or five hours at a time. According to this statement, the cost of the operation is about 4s. an hour; and the work done is equal to 960,000 lbs., or thirty times 33,000 lbs., raised one foot high per minute. This puts the cost of a horse power produced by steam equal to about 1½d. an hour, even under the unfavourable condition of an irregular employment of the engine, with the constant payment of the engineer; and of course it is much less than this in the case of the large and constantly working fixed pumping engines of our mines and waterworks.

The cost of the more ordinary agricultural engine must be gathered rather from ordinary experience than from the records of "racing" trials at an agricultural show; and I shall not be far wrong in putting the daily expenditure on an eight-horse agricultural locomotive engine as follows:—

Coals, 6 cwt. say	...	...	...	...	6s.
Water carting	...	...	...	...	4s.
Oil, &c.	...	...	...	...	1s.
Engineer's wages	...	...	...	...	4s.
Interest, and tear and wear, say 15 per cent. on	...	...	...	...
£250 divided over fifty-two days, about	...	...	...	...	15s.
					<hr/>
					30s.

Or 3s. an hour, corresponding to $4\frac{1}{2}$ d. per horse power per hour.

On a six-horse power fixed engine, costing about £250, which for many years was worked on a farm under my superintendence, the cost of "tear and wear" being then much less than in the case of the locomotive, the daily expenses stood as follows:—

	s.	d.
Coal, 6 cwt.	6	0
Oil, &c.	1	0
Engineer (a farm labourer)	2	6
Interest, &c., 10 per cent. divided over fifty days ...	10	0
	<hr/>	
	19	6

Or barely 2s. an hour; and therefore about 4d. per horse per hour. Another ten-horse power fixed agricultural engine known to me costs daily:—

	s.	d.
Coals, 8 cwt.	8	0
Oil, &c.	1	0
Engineer (a farm labourer)	2	6
Interest, &c. 10 per cent. on £400, divided over 100 days	8	0
	<hr/>	
In all	19	6

Which is about 2s. a day, or not $2\frac{1}{2}$ d. per horse per hour. It is plain that these amounts will diminish in proportion as the actual horse power got out of the engines exceeds the nominal horse power to which these estimates refer, and also in proportion as the engine is kept constantly employed, so that the annual interest of capital invested in it should come to be divided over a greater number of days. It seems also plain enough that, other things being equal, under ordinary circumstances the fixed engine must be a cheaper source of power than the locomotive, owing to the large share which repairs of tear and wear must have in its cost.

The relative merits of the two were discussed some years ago at the London Farmers' Club, when Mr. Allan Ransome, of the well-known firm at Ipswich, recommended, as the engine most applicable to agricultural purposes, for powers up to six or eight horses, that known as the horizontal engine, with the Cornish boiler, if to be used as a fixed engine, and with the multitubular boiler on wheels, if to be used as a portable engine. And on the question of preference between fixed and portable engines he

referred on the part of the former to the greater cheapness, durability, and the less liability to stoppage for repairs, less annual cost, and less attention required to make it work to advantage; and, on the part of the latter, to the facts that the crops might often be threshed directly from the stack, and the expense of removing into the barn avoided, and that as on most farms there could scarcely be found full employment for a steam engine, the use of the portable engine might be shared by two or three others. The general tendency of subsequent speakers on that occasion was to recommend fixed engines. But the history of the past fifteen years has completely upset the anticipations of these speakers, and the portable engine may be now pronounced the almost invariable form of agricultural steam power. The new use found for it in the cultivation of the land has arisen during this time, and it more than ever justifies the conclusion that these portable engines are of the greatest agricultural benefit.

A direct comparison of the cost of steam power with that of horses in the work of cultivation, will be attempted in the chapter on horse power; and the cost of different processes, whether of cultivation or otherwise, into which steam power enters, will be estimated in a number of instances, in the fifth section of this book.

9. Quantity of Steam Power now used in Agriculture.—What the total quantity of steam power now in agricultural use in this country may be we have no means of ascertaining. Of its annual increase, however, we can more easily judge.

From returns by all the leading manufacturers of steam engines for agricultural purposes, given to me some years ago, it appeared that 10,000 horse power was then being annually added in steam alone to the forces used in agriculture. Messrs. Clayton and Shuttleworth of Lincoln, Garrett of Saxmundham, Hornsby of Grantham, Ransome of Ipswich, and Tuxford of Boston, were then indeed alone furnishing that quantity of horse power annually to the farmer. Messrs. Tuxford, among the first to start the locomotive agricultural steam engine, inform me that for the earliest suggestion of it they were indebted to Mr. John Morton, of Gloucestershire, then agent to the late Earl of Ducie, who nearly thirty years ago recommended them to put their engines upon wheels, thus foreseeing the fitness of these powers made locomotive to the circumstances of English agriculture. Messrs. Ransome of Ipswich were, I believe, the earliest to receive the

commendations and the prizes of the Agricultural Society of England for their engines; and now the leading manufacturers of them, Messrs. Clayton of Lincoln, send out ten of them each week, or 4,000 horse power per annum.

This large force of course is for the most part employed at the homestead in threshing, grinding, cutting &c.; but it is also employed on many farms in cultivation in the field. Some hundreds of sets of steam-cultivating tackle are now at work, and tens of thousands of acres are annually stirred or ploughed in this country by steam power; and it may be considered certain that the use of steam power for this purpose will now rapidly increase. It is the more powerful of our locomotive engines which are available for field work; but concurrently with the extension of the manufacture in this direction, a large number are now being made of two and three horse power for doing the less laborious work of cutting and grinding cattle-food, &c. Mr. Nicholson, of Newark, who has, I believe, the credit of foreseeing the fitness of these small engines to our gradually altering agricultural circumstances, informs me that he first showed one at the Lincoln meeting of the Agricultural Society (1854), while at Warwick, five years later, no fewer than thirty such engines were exhibited by different makers; and they now form a considerable section of every exhibition of agricultural steam-engines. And it may be repeated, that of the whole agricultural steam power now annually added to the forces used in agriculture by the engines turned out from the yards of the manufacturers, but a small percentage is derived from fixed engines. The profitableness of locomotives let for hire along with portable threshing machines, creates a greater demand for steam power in that form than is presented by those landowners who give orders for fixed barn machinery in newly erected homesteads.

10. Economical Management of the Steam Engine.

—Under this head I propose merely to quote the instructions given by Messrs. Ransome, in the nineteenth volume of the *Agricultural Society's Journal*. They relate to the portable engine only, but are essentially applicable to both kinds. They are given, very much abridged, in the following paragraphs:—

- (1.) Place the engine as level as possible, and in such a position that the dust caused by threshing may not be blown upon it.
- (2.) Procure water as clean as possible for the use of the engine. Fill the boiler till it appears about half way up the glass gauge tube.
- (3.) The water-gauge cocks should always be tried before the

fire is lighted, to ascertain that there is no obstruction in the passages which would prevent the water finding its proper level in the glass tube; the bottom one should discharge water only, and the top one steam; the level of the water in the boiler being somewhere between the two gauge-cocks.

(4.) The fire-bars must be well cleaned from dirt and clinkers before the fire is laid; a few dry shavings and a small quantity of firewood should then be spread over the bars, and some small coal scattered over them; a light may then be applied to the shavings from beneath the grate bars, and the fire will soon burn briskly; coal may then be put on in small quantities at a time, the fire-bars being kept covered to a depth not exceeding three inches; the fire must be clear, but the bars must not be allowed to become bare of coal in places, for the cold air will then pass through the tubes, and check the formation of steam; all wet straw and damp wood should be avoided for lighting the fire. As soon as the fire is lighted, a few pails of water should be poured into the ash-pan.

The fire as it burns up should be kept thin and bright; the coal must never be heaped up against the tubes; too much coal should not be thrown on at a time, or it will tend to delay the production of steam. Wood should never be used as a fuel when the engine is at work, on account of the great quantity of ignited pieces blown out of the top of the tunnel by the steam blast; the foolish and dangerous practice of carrying hot coals in shovels from the farm-house to the engine in the stack-yard for the purpose of lighting the fire should never be allowed.

(5.) If the coal is bad, or of a kind which emits a large quantity of smoke, the tubes should be well brushed out during the dinner hour; this can easily be done without dropping the fire, by allowing it to burn low, and raking it into one corner of the grate.

(6.) As soon as the water begins to boil, the safety-valve should be opened by hand and examined, to make sure that it is not obstructed in any way; the spring-balance may then be screwed down to about 10 lbs., and when the steam blows off at that point, it may be gradually screwed down to 45 or 50 lbs. as the steam rises. The spring-balance should on no account be left always screwed down to the full pressure when the engine is not at work, and the steam not up.

(7.) Before starting, put a little oil into the cylinder, through the cock provided for the purpose, and move the engine round by

hand, by means of the fly-wheel, to ascertain that it is all in working condition; all the oil-cups must be filled up and the syphon-wicks examined, to make sure of their being in good condition. A little oil should be put upon the guide-bars themselves, as well as into the oil-cups attached to them; the pump-plunger, and all the eccentrics, must also be oiled. Neatsfoot or sperm-oil should be used; but if this cannot be procured, olive-oil will answer the purpose.

(8.) The piston should be placed at about the half-stroke, and the regulator-valve opened gradually, the two relief-cocks on the cylinder being previously opened; after the engine has made a few revolutions these cocks may be shut, and the regulator-valve set full open, so that the speed of the engine may be controlled by the governors. The feed-pump should be tried as soon as the engine is in motion, to ascertain that it is in working condition, before the water has had time to diminish.

(9.) It is desirable to have a constant supply of water always going into the boiler from the feed-pump; a little experience will soon point out to the engineman how far the cock requires to be open to enable him to do this.

(10.) There should never be less than two inches of water visible in the glass gauge-tube when the engine is at work; if, by accident or neglect, the water should become so low as only to show about half an inch in the glass tube, the fire should instantly be dropped, by lifting the fire-bars from their places by means of the tools furnished for the purpose, the burning coals will fall into the water in the ash-pan, and be extinguished; water should never be thrown into the fire-box to put out the fire, it is apt to scald those who do so, and to injure the fire-box; the fire must on no account be again lighted until the boiler has been filled up.

(11.) The bearings and guide-bars should be carefully examined from time to time to see that they are properly supplied with oil from the lubricators attached to them; it is a good plan to put a little extra oil upon the guide-bars, in addition to filling the lubricators upon them. Whenever the engine is stopped, all the bearings should be felt, to make sure that they have not heated; if there be any disposition to heat, the bearings having such a tendency may be loosened a little, but they must not be too slack.

(12.) When the day's work is over, and the engine is going to be moved to another place, the water should be run out of the boiler when the steam is quite down; the practice of blowing all

the water out of the boiler directly the fire is dropped is a very bad one, for the sudden contraction of the tubes caused by the rapid cooling makes them leaky.

(13.) After the day's work is done the engine should be well rubbed over with cotton waste, and all dust and grit should be removed, also all superfluous oil which may have accumulated during working; the chimney should be lowered down, and the engine be covered over with the tarpauling furnished for that purpose: the engine should always be carefully covered up when travelling, to prevent the working parts from becoming injured by dust or mud.

(14.) The boiler must be well washed out and cleansed after about twelve or fourteen days' working; to do this the brass plugs and mud-doors round the bottom of the outside shell of the fire-box must be taken out; water must be poured freely into the boiler through the opening where water is poured in, the mud and scales being at the same time loosened and pulled out with a small iron rod, the end of which should be made like a hoe; at the same time the plug beneath the tubes in the smoke-box should be taken out, and the man-hole cover be lifted off; a long rod being pushed backwards and forwards through the hole under the tubes, so as to loosen the dirt and sediment. Water should be poured into the man-hole plentifully, so as to wash out all that may be collected in the boiler through the various mud-holes, which should all be open during this operation.

11. Water Power for Agricultural Purposes.—Let us turn now to another power which, when available, is necessarily cheaper than any other, and which is especially adapted to such operations as need an hour or two almost daily for their performance in almost every homestead. I propose, in elucidation of this subject, to give the reports of two gentlemen who have with considerable difficulty obtained water-power for such use upon their premises. (1.) My first report is from J. T. Harrison, Esq., late of Frocester Court, near Stonehouse, Gloucestershire. He says:—

“There are some operations on a farm, such as chaff-cutting and pulping, for which water power is much more convenient than steam or horses. They have to be performed daily, and it is therefore of immense advantage to have an inexpensive power at command to perform these operations. Besides chaff-cutting and pulping, oat crushing for the horses, corn grinding for the *pigs* and cattle, threshing, winnowing, and apple grinding in the

cider districts, may be done at a less cost by water than by steam, where sufficient power can be obtained ; but steam can be applied for these latter operations very usefully, as the work may be continued steadily all day, which is not the case with daily operations of short continuance. We find great advantage in very wet weather in being able to turn all hands into the barn to thresh, as it would be difficult then to employ them otherwise. Ours is, however, an exceptional case, in consequence of our immense barns enabling us to stow away a large proportion of the corn grown on the farm.

“ At the present time we are cutting 18 cwts. of chaff and pulping 3 tons 8 cwts. of roots daily, and occasionally bruising oats and grinding corn by water-power.

“ To accomplish this work we are obliged to be careful and not waste any water. The quantity of water flowing into the reservoir per diem is about 500 cubic feet per hour, or at the rate of 84,000 cubic feet per week. From the level of the water in the reservoir to that of our turbine there is a fall of about twenty-two feet.

“ The quantity of water driving the water-wheel whilst we are

“ Chaff-cutting is	...	...	92 cubic feet per minute.
Pulping roots	...	...	103 ” ”
Chaff-cutting and pulping together	...	...	114 ” ”

“ We can cut $\frac{1}{4}$ -cwt. of chaff per minute, and pulp thirty cwts. of swedes in twenty-seven minutes, or thirty cwts. of mangolds in twenty minutes.

“ Thus we find it takes to cut 18 cwts. of chaff, say...	1 $\frac{1}{4}$ hours.
And to pulp 3 tons 8 cwts. of roots ...	... 1
Total, 24 hours' work for the food daily consumed.	

“ And in doing this it will be found on calculation that we use about 86,000 cubic feet of water per week, with the twenty-two feet fall, which is, I believe, not far from the average truth ; though probably at the beginning of the week less water is used to do the work, as it then stands somewhat higher in the reservoir.

“ The following information may be useful to those who have a pretty steady supply of water, if only in the winter season, when for chaff-cutting and pulping its application would be very useful.

“ The first thing to ascertain is the quantity of water at command. For this purpose take a piece of board of sufficient length to cross the stream, and, say eighteen inches wide. Cut a piece

out of one side of it, say three inches wide and nine inches deep, and make the edges smooth for the water to pass freely (these dimensions must, however, depend upon the quantity of water, and the opening must be widened so as to permit all the water without waste to pass through it). Fix the board across the stream, and by puddling the bottom and sides force all the water to pass through the aperture. When the water has risen as high as it can, mark exactly the height in feet at which it stands above the bottom of the opening; this dimension in the following rule is represented by H , and the width of the aperture in feet by W .

"The quantity of water passing in cubic feet per minute is equal to $200 \times H \times W \times \sqrt{H}$. For example, the aperture used to ascertain the quantity of water passing from the water-wheel was 1.17 feet wide, and the height at which the water stood when cutting chaff was .54 feet. Then $200 \times 1.17 \times .54 \times \sqrt{.54}$ (or .73) gives 92 cubic feet as the quantity passing every minute.

"Having ascertained the quantity of water which is available, the next point is to find out, by means of a spirit-level, what fall you can obtain. You have thus decided the elements of the power at your command, namely, the quantity of water per minute and its fall. But as the water is running constantly, and you require it only for a short time each day, you may, by forming a reservoir for the water, bring a force to bear for a short time considerably larger than were the water used constantly. Our reservoir (part of the old moat enlarged) holds 300,000 cubic feet or more.

"The reservoir should be as close as possible to the water-wheel, as it adds considerably to the first cost when the water has to be conveyed far in pipes (in our case, where the reservoir is 700 feet from the wheel, the twelve-inch cast-iron pipes cost fully £100 extra), and there is besides a great loss of power from friction on the sides of the pipes.

"For general purposes the wheel we use answers admirably; it is a turbine, made by Mr. Whitelaw, of Glasgow (Messrs. Randolph, Elder and Co., Glasgow, manufacture similar water-wheels), and has not cost one shilling for repairs during the last eight or nine years, and is now as good as ever. This description of water-wheel is preferable to others for farm purposes, on account of the great velocity with which it works; ours makes 200 revolutions a minute, so that there is no occasion for multiplying cog-wheels even for threshing, as the requisite speed is obtained by a large wheel driving the strap, as in the steam threshing machines. The

turbine has, moreover, the advantage of producing a greater effect from a given quantity of water falling through a given height than any other description of wheel.

"Having determined of what horse power it is desirable to have the water-wheel—say not less than five-horse power if it be desired to thresh with it, or three-horse power if it is only to be used for chaff-cutting and pulping; and having ascertained the fall that can be obtained for the water, the following rule will give the quantity of water that is required per minute to drive the wheel.

$$\left. \begin{array}{l} \text{"The quantity of water } \} \\ \text{per minute in cubic feet } \} \end{array} \right\} = \frac{696 \cdot 73 \times \text{number of horse-power.}}{\text{Fall of water.}}$$

"Our turbine is fitted with regulators, as in the steam engines, so that when the work is light, and the velocity increases, the balls fly out, and by means of levers lessen the aperture for the escape of the water.

"Calculating from the data given above, and making allowance for the diminution of power in consequence of the friction of the water in passing through the pipe, and taking the fall at twenty-two feet, about which it was when we ascertained the quantity of water used, we have—

		Cubic feet per minute.	
"The number of horse-power	}	$\frac{93 \times 22 \text{ feet fall}}{696 \cdot 73}$	= 2·9 horses.
used in chaff-cutting ...			
„ in pulping ...			= 3·25 „
„ both at once ...			= 3·6 „

"The maximum discharge of water which occurs when we are threshing with a head of twenty-five feet, gives an effective power of about four and a half horses.

"For further particulars your readers may be referred to the 'Engineer and Machinists' Assistant,' published by Messrs. Blackie and Son, Glasgow, in 1846, which gives very full and excellent information on the subject of water-wheels of every description."

(2.) The following interesting report is added on the same subject from P. MacLagan, Esq., M.P., of Pumpherstone, West Lothian. I give the account in full detail as illustrating the way in which the difficulties of obtaining water power have been overcome.

Mr. MacLagan says :—"I will first describe the circumstances which in my case make water power suitable and economical, and the mode in which these circumstances have been turned to

account. There is a natural and uniform fall of about 130 feet from the highest to the lowest part of my farm. My steading is situated about the middle of the declivity, that is, about sixty-five feet from the highest point. The principal drainage of the district is from west to east, so that the drainage-water of some of the lands to the west of mine, flows through my farm in several ditches. Fortunately, two of these ditches were on the highest of my grounds, about ten years ago an unimproved moor, the centre of which was very level, so that by throwing up a low dam the water was intercepted in its course, and a pond was formed of considerable extent. The waste water, after the pond was full, was made to flow to the south towards my steading, and a sluice was put into the south dam to let off the water in the same direction. About 200 yards below this was an old quarry-hole, near which was another ditch conveying the water from the west. This water was also dammed back, and filled the quarry-hole, forming a second pond of considerable size, the waste water from which flowed south also down a hollow, and a sluice was placed in the dam. About 200 yards north of the steading, the form of the hollow was such that by throwing up another dam at a trifling expense, there was obtained a third pond, in which also a sluice was placed.

“Such was the state of matters when I came into the possession and occupancy of the farm about thirteen years ago. As it was my intention to go on vigorously with improvements, calculating upon a considerable increase of produce, I felt convinced that, as there was not a constant supply of water, for which my whole dependence was on the clouds, I should be put to inconvenience in the threshing of my crop. Therefore, whenever my men and horses were not busy in summer after all the crops were sown, I commenced to deepen the ponds, and enlarge them. I took out two or three thousand cart loads of water-fed soil and vegetable matter from them, with which lime was mixed, forming a valuable compost which more than paid for the labour. Some of the clay bottom was also taken out, and carted on to the banks to strengthen them, and raise them in height. As the moor round the upper pond was planted, and it was necessary to have roads by which the trees might be carted out when they were cut down at a future time, the dams of this pond were made wide enough to be used for cart roads when required. The supply of water has also been largely increased, by cutting feeder drains, which convey to the lower ponds a great part of the drainage-water of the lands on the

higher levels, that used to flow in a different direction before the fields were drained. The ponds or reservoirs now extend to about four acres, and are capable of containing water sufficient to thresh from 150 to 200 qrs. of wheat.

"I am sorry that I cannot give you from my own experience, as you request, a statement of the relative cost of water, steam, and horse power. A few years ago, however, when making inquiry into the expense of threshing by steam, I obtained from some neighbours a few particulars which I will now make use of in a comparative statement of water and steam power. I have selected two steam engines for the comparison; the one was old, and belonged to a tenant whose lease was near its termination, so that in all likelihood at the commencement of a new lease he would have made a thorough change in his machinery; the other belonged to a tenant who had just entered on a new lease, and had erected a new steam engine and threshing machine, the details of the average working of which, during the first winter, are given below. The first engine and mill cost probably about £160, the second cost £190, and my reservoirs, water-wheel, and threshing-mill were valued over to me at £145. As this is a comparative statement between steam and water power, it is not necessary to enter into any details excepting those in which they differ, such as the consumption of coal, and the time of a man to attend on the steam engine while it is working, which is not required in a water-mill. I believe too that there ought to be a larger sum allowed for the annual tear and wear of the steam engine than for that of the water-mill, but I have not taken this into account at present.

NO. 1 ENGINE.

Cylinder.	Boiler.	Quantity threshed of Wheat per hour.	Coals consumed per hour.	Cost of Coals consumed per hour, including Carriage.	Attendances on Engine per hour.	Total for Coals and Attendance per hour.	Cost of Coals and Attendance per quarter.
9 in.	14½ ft. long.	2 qrs.	2 cwts.	1s.	3d.	1s. 3d.	7½d.

NO. 2 ENGINE.

11 "	18 ft. by 3'10	4½ "	1½ "	7½d.	3d.	os. 10½d.	2½d.
							2) 9½d.

Average of cost of coals and attendance per qr. of wheat . 4½d.

WATER MILL.

Overshot wheel 18 ft. 2 qrs. in diameter.	"	"	"	"	od.
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According to the above, then, it costs $4\frac{3}{4}$ d. per qr. more to thresh by steam than by water. This is no doubt too high, owing to the comparative inefficiency of No. 1 Engine, but a common calculation for fuel in this district is 2d. per qr. when the carriage of coals is included, to which we must add $\frac{3}{4}$ d. or 1d. per qr. for attendance on engine. It must not be supposed that these threshing mills could not do more work than what we have stated above. The figures indicate the average rate of work performed by them with the ordinary force of labourers on the farm."

12. Wind-power for Agricultural Purposes.—On this I must merely say that more windmills, during the past twenty years, have been destroyed than have been erected. They have been displaced by steam or water power—the certainty of these being more than a compensation for their greater cost. It is, however, proper to add, that a wind engine manufactured by Mr. Peill, of New Park Street, Southwark, which possesses self-regulating appliances, so that, once set, it needs no superintendence beyond a weekly oiling of its bearings, is coming into pretty frequent use for pumping water, for grinding corn, crushing oats, cutting chaff, and driving other farm machinery, where a constant power is not required. It costs about £50 per nominal horse-power, and numerous testimonies are being received of its fitness for work of the kind just named. For instance, Mr. Christy, of Boynton Hall, near Chelmsford, thus answers a correspondent of the *Agricultural Gazette*:—

"I have one of Mr. Peill's wind engines of $\frac{3}{4}$ horse power, with one of Messrs. Warners' pumps attached, that has been at work about nine months. It is erected nearly half a mile from the premises, and pumps the water from a spring to a height of seventy feet: supplying the house and farmyards, and filling a large pond that has been dry for years. It requires very little wind, and (owing to the sails being self-adjusting) no attention save oiling once a week. If placed near the farmstead, it might be used to drive a chaff engine, &c., when not required for pumping."

III. HORSE POWER.

THE results of a number of inquiries on this subject, which had been addressed during the autumn of 1858 to correspondents in all parts of the island, were embodied by me in a paper on the *cost of Horse Power*, which was published in the 19th volume of the *English Agricultural Society's Journal*. They are repeated

here in somewhat different order, so as to bring out more perfectly what information they convey on the economical management of horses.

The following chapter, however, is essentially the same as has been already published on the subject in the *Journal of the Royal Agricultural Society of England*.

13. The Food of the Horse.—The following describes the practice and experience of the late Robert Baker of Writtle on this subject, as related by him in one of the latest of the many contributions to agricultural literature made during his useful professional life. He writes as follows:—

(1.) “My present treatment of horses from Michaelmas to April is as follows:—Their daily food consists of—

Clover hay	...	...	...	...	10 lbs.	} cut into chaff.
Straw	...	...	...	...	20 lbs.	
Good oats	...	...	...	...	10 lbs.	
<hr/>						
40 lbs. per diem.						

During the seed times (about five weeks each) 4 or 5 lbs. of good old split beans additional are given per diem, and from the end of November till the middle of February the oats are in part taken off, according to circumstances,—reduced to 6 lbs. per diem, the full quantity of 10 lbs. being given always whilst at plough-work.

“During the spring months, say from the middle of April, my horses have early rye, mown green, and cut up with the hay and straw, increasing the former and diminishing the two latter weekly, until by the middle of May rye alone is used cut as before; and the horses will continue to eat it when so managed till the middle of June, when the rye has come fully into ear, and at that period they get in better condition than at any other portion of the year. From the time that the rye ceases, vetches with rye are substituted for about two weeks, and then vetches, or red clover mown, or lucerne, are substituted, but not always cut up, as before, into chaff. The horses are kept in the yard so long as food can be procured, which is sometimes the case until the second mow of red clover is fit for mowing, which is combined with hay and straw, and cut up daily for the teams *ad libitum*. If, however, the mow is abundant, it is given alone, *i.e.* with only the addition of late spring tares, if the season is suitable; but this depends entirely upon the season, as in cases of drought the late tares do not succeed in the eastern counties.

“My horses, I calculate, eat 1 peck of good sound oats daily, or say 2 bushels per week for eight months in the year; and

when eating green food in the summer months, say 1 bushel each per week—rather less than more; but upon heavy-land farms another bushel of oats, or beans and oats, is given for six weeks in the autumn and spring seed-times per week. A horse will require dry food at least seven months in the year, and, eating about 21 lbs. per diem, will during that period eat about 35 cwt. of hay per annum; and he will eat in addition about 1 cwt. of green food per diem during the remainder of the year, say 150 days, or from 7 to $7\frac{1}{2}$ tons for that time. The best of the oat straw, and pea and bean straw, may be reckoned to supply food for two months of the year.

"The cost of horse-keep in Essex upon the above principle of management will for each day be about the same as that of a farm-labourer, but for all calculations a further sum must be added to meet the wear and tear of the horse and for shoeing, to which the farmer is not liable as regards manual labour. The sum of 3s. per horse per day during that portion of the year comprised from Lady-day to Michaelmas is assumed by valuers as the fair sum to be paid for each horse for each working day when at plough, and 2s. 6d. when at other work, per diem. An experiment was once made by myself as to the annual consumption of food by a farm horse, and the conclusion arrived at was as follows:—

	£	s.	d.
"2 tons of hay at feeding value	6	0	0
7 tons of green food at 20s.	7	0	0
9 qrs. oats at 24s	10	16	0
1 qr. of beans at	1	16	0
Add straw and chaff	1	10	0
Cost of keep for one year	27	2	0

"My horses are fed in open yards, with sheds, each parted off for a team of four horses. These, upon returning from labour, are unharnessed and fed in the stable until about six o'clock, when they are put into the yard with a sufficiency of cut chaff for the night. At from four to five o'clock in the morning they are brought into the stable, and fed with the corn and chaff until the time of going out to work—in summer half-past five o'clock, in autumn half-past six o'clock, and in winter rather later. They work until ten o'clock, and invariably come home and are fed and watered, one hour being allowed. They then return and work till three o'clock, an acre of ploughing being performed. This mode of management appears congenial to the health of the horses, as *we rarely have any sickness among the teams, and I have not lost*

more than two horses during the last six years from upwards of twenty constantly worked."

Mr. Baker's practice and experience are given at full length in the foregoing paragraphs; but in the following account of the stable practice upon other farms, the facts are stated in as condensed a form as possible, so as to embrace the results of an extensive inquiry within the compass of a few pages.

(2.) The following tables give the daily ration adopted in the farm stable during spring, summer, autumn, and winter respectively, by those whose names are in every case attached. In successive columns I have put, first, the number of the case; secondly, the authority on which it is given; thirdly, the weight consumed per week of hay, oats, beans, roots, clover, and straw by a horse; and lastly, the calculated weekly cost of so maintaining it. This cost is calculated at the rates of 3s. a cwt. for hay, 3s. a bushel for oats, 5s. a bushel for beans, 4d. a cwt. for turnips or mangold-wurzel, 6d. a cwt. for carrots and clover, and without charge for straw. Where an *asterisk* (*) is attached to any item it is to be understood that the corn has been bruised or ground, or the hay or straw has been cut into chaff; where a *dagger* (†) is appended, the article so marked has been boiled or steamed; a mark of interrogation (?) indicates that the result so marked is uncertain, owing to some indefiniteness in the account given. The prices adopted in calculating the cost of food are the market prices of the *grain* consumed; and in the cases of the *hay* and *green food*, the value which it is supposed they might produce if given to other kinds of live stock on the farm.

There are no fewer than 115 cases named in the tables. If any of the methods of feeding described should seem whimsical, the excuse which must be taken for their appearance is, that not one of them is merely fanciful—not one of them is a mere scheme or a proposal—every one is actually adopted and in use on farms, many of them in whole districts in this country.

There is considerable difficulty in estimating the cost of pasturage, cut clover, and other food supplied *ad libitum*. It will be found in the money column of the following table, which specifies the calculated cost per week of food alone for each horse in the stable, that 5s. a week has been charged for pasturage alone, 6d. a cwt. for cut clover carried to the stable, and from 1s. 6d. to 3s. a week for night pasturage, according to the quantity of other food supplied. When that is tolerably abundant, and clover is supplied *ad libitum*, it is supposed that each horse will eat one cwt. a day.

No.	Name and Address.	Hay.	Oats.	Beans.	Roots.	Clover.	Pasture.	Weekly Cost.
	THE SUMMER SEASON.	lbs.	lbs.	lbs.	lbs.	lbs.	ad lib.	£. d.
1	Professor Low—Elements of Agriculture	...	...	...	...	...	...	5 0
2	H. Stephens—Book of the Farm	...	35	...	...	1,400	...	8 9
3	J. Gilson, Woolmet—Highland Soc., 1850	...	...	...	...	ad lib.	Night.	7 6
4	— Binnie, Seton,	...	50	...	...	5s. 3d.	...	9 0
5	"	...	70	28	...	ad lib.	Night.	11 0
6	"	...	50	...	...	ad lib.	Night.	8 0
7	Thomson, Hangingside "	...	84	...	...	ad lib.	...	9 6
8	— Barthropp, London Farmers' Club, 1853	...	20	80	...	2s.	...	9 9
9	"	...	...	48	...	3s.	...	9 9
10	J. Morton, Whitfield Farm, 1843	...	70	...	...	784	...	8 9
11	Mr. C., quoted at Gloucester Farmers' Club, 1843	...	80	...	...	5s.	...	11 0
12	W. Gater, Botley Farmers' Club	...	...	16	Bran. 2 bushels.	ad lib.	...	8 0
13	W. C. Spooner, Ag. Journ., vol. ix., p. 274	...	42	...	...	5s.	...	8 0
14	J. Twynam, Botley Farmers' Club	...	42	...	...	2½ rods.	...	5 9
15	F. Baldwin, Glasnevin	...	35	...	...	700	...	6 0
16	J. Coleman, Cirencester	...	42	...	...	ad lib.	...	6 6
17	J. Cobban, Whitfield	...	42*	...	...	ad lib.	Straw. ad lib. Night.	6 9
18	E. W. Moore, Colehill	...	63	32	...	ad lib.	Pasture.	10 6
19	"	...	63	...	...	ad lib.	Night.	8 0
20	S. Rich, Didmarton, Gloucestershire	84*	31½	...	...	1s.	Night.	7 6
21	F. Sowerby, Aylesby, N. Lincolnshire	...	...	28	...	...	2 acres. ad lib.	6 0
22	THE AUTUMN SEASON. Professor Low—Elements of Agriculture	140	70	...	...	...	Straw.	9 0
23	"	140	50	...	Potatoes.	...	...	7 6
24	W. Gater, Botley F. Club	188	63*	32*	70	...	...	12 0
25	W. C. Spooner, Agr. Soc. Journ., vol. ix., p. 274	112	84	24	...	...	...	11 0

26	T. Aitken, Spalding, Lincolnshire	...	...	37½	...	...	ad lib.	...	7 6½
27	T. P. Dods, Hexham	...	...	37½	35	...	ad lib.	...	10 0½
28	"	...	...	105	...	...	ad lib.	...	10 6½
29	"	...	ad lib.	105	...	...	...	...	10 6½
30	A. Ruston, Isle of Ely	...	ad lib. ½	84	10	Bran. ½ bushel.	...	ad lib. ½	9 0½
31	A. Simpson, Beaulieu, N.B.	...	168	70	14	...	...	24 lbs.	10 0
32	H. J. Wilson, Mansfield	...	...	52½	...	...	ad lib	Straw.	7 3½
33	" THE WINTER SEASON.	...	42	87½	...	Bran. 21 lbs.	...	ad lib.	9 0
34	Professor Low—Elements of Agriculture	...	...	70	...	...	...	Straw. ad lib.	5 3
35	"	...	56*	59	...	Potatoes. 70½	...	...	4 2
36	"	...	...	56*	...	56½	...	56*	6 6
37	H. Stephens—Book of the Farm	...	...	70	...	112	...	70	5 7
38	"	...	112	35	...	112	...	...	6 0
39	"	...	...	56	...	77½	Potatoes. ...	105*	4 6
40	J. Gibson, Woolmet—Highland Soc., 1850	...	...	84	...	217½	...	112*	9 0
41	— Binnie, Seaton	...	...	70*	28*	243½	Barley. 42½	ad lib.	11 6
42	— Steedman, Bognall	...	...	70	...	500	Linseed. 3½	ad lib.	7 6
43	— Thomson, Hangingside	...	...	84	14	336	Barley. 14	ad lib.	9 6
44	— Black, Dalkeith	...	112	84*	...	196½	...	...	10 0
45	— Barthropp—London Farmers' Club, 1853	...	112	21	80	224	...	...	11 8
46	"	...	112	...	48	224	...	...	7 6
47	Mr. C., quoted by Mr. N., Gloucester F. Club	...	...	84	...	...	Carrots. 784	...	9 6
48	J. Morton, Whitfield Farm	...	...	126	...	...	350	ad lib.	10 9

No.	Name and Address.	Hay.	Oats.	Beans.	Roots.	Clover.	Pasture.	Weekly Cost.
		lbs.	lbs.	lbs.	lbs.	lbs. Pollard.		s. d.
49	W. Cater, Botley Farmers' Club	...	...	32*	...	40	ad lib.	5 6
50	J. Twynam,	112	63	16	...	...	...	8 9
51	— Trotter, Darlington F. Club, 1845	ad lib.	84	64	...	...	...	14 0 1
52	" "	...	73	Cut Oat Sheaf.	...	...	110	5 3
53	W.C. Spooner, Agricultural Gazette, 1845	28	63	16	112	...	28	7 0
54	H. Briggs, Overton,	140	110	...	...	...	...	11 6
55	" "	294	...	...	...	Linseed.	...	7 6
56	" "	...	...	64*	...	3½	140	6 6
57	Quoted by Bacon—Agriculture of Norfolk	56*	44	28*	...	...	...	7 0
58	" "	75	42	21	...	...	...	6 8
59	" "	75	...	64*	a few.	...	...	7 6
60	" "	112	42	25	...	Bran.	...	9 6
61	" "	112	84	...	...	16	ad lib.*	10 0
62	Bartliever Farm, Ag. Journ., vol. vi., p. 454	...	84	...	112	...	70*	7 0
63	" "	112	42	...	112	...	...	7 0
64	R. Smith, Bath & W. of Eng. Soc. Jour., vol. i.	147	73½	...	...	...	...	9 3
65	" "	98	37	28	...	...	49*	8 0
66	" "	70	...	56	...	Bran.	70*	9 6
67	" "	140	56	...	49	49	...	8 3
68	" "	70	...	...	56	Tail Corn.	70*	5 6
69	" "	98	98	...	49	49	49	9 9
70	" "	24*	37	...	...	Linseed.	140	5 3
71	" "	84	44	49	...	14 Grains.	...	12 0
72	" "	154	...	...	...	140 Grown Barley	...	9 0
	" "	...	...	...	...	84	...	...

73	R. Smith, Bath & W. of Eng. Soc. Jour., vol. i.	49	...	37	...	Linseed.	98	5 0
74	"	70	...	70	Potatoes.	7	70*	7 3
75	"	49	...	35	70	Grains.	49*	6 0
76	"	140	..	...	Turnips.	42	...	8 0
77	"	70	52	...	84	Tail Corn.	70*	8 3
78	"	77	37	21	...	63	...	7 6
79	"	...	73	...	...	Oil-cake.	...	6 3
80	W. C. Spooner, Agr. Soc. Jour., vol. ix., p. 274	...	63	...	...	28	...	4 9
81	T. Aitken, Spalding, Lincolnshire	ad lib. §	37½	35	...	...	ad lib. §	9 0
82	G. W. Baker, Woburn, Bedfordshire	...	60*	20*	...	...	...	9 8
83	R. Baker, Writtle, Essex	...	42	...	...	...	...	5 0
84	"	70	73	...	...	...	140	7 3
85	J. Coleman, Cirencester	70	84	16	...	...	ad lib.	7 3
86	T. P. Dods, Hexham	...	95	...	...	...	ad lib.	8 0
87	T. Baldwin, Glasnevin	210	70*	...	56	Carrots or Bran.	...	11 6?
88	J. Cobban, Whitfield	84*	60*	...	49	42†	ad lib.*	7 3
89	S. Druce, jun., Eynsham	112	52½	...	3½	...	2 bushels.*	7 0
90	C. Howard, Biddenham	ad lib. §	52½	17½	70	...	ad lib. §*	8 6?
91	J. Laidlaw, Frampton-on-Severn	...	84	...	84	Carrots.	ad lib.	7 6
92	L. J. Mechi, Tiptree	49*	70*	...	M. wurzel.	336	ad lib.*	7 6
93	D. A. Milward, Waterford	35*	49*	...	210	...	35*	7 0?
94	W. J. Pope, Bridport	2*	84	...	Turnips.	1464*	ad lib.	9 0?
95	S. Rich, Didmarton, Gloucestershire	168	63	...	280†	Grains.	ad lib.	10 8
96	A. S. Ruston, Isle of Ely	ad lib. §	84	...	...	2 bushels.	ad lib.*	8 0?

No.	Name and Address.	Hay.	Oats.	Beans.	Roots.	Clover.	Pasture.	Weekly Cost.
97	H. E. Sadler, Lavant, Sussex	lbs. 140	lbs. 84	lbs. ...	lbs. ...	lbs. ...	...	s. d. 9 9
98	E. H. Sandford, Dover	...	42	...	...	Bran. 12	ad lib.	5 6
99	A. Simpson, Beaulieu, N.B.	...	49	7	105	Tail Corn. 21	ad lib.*	5 6
100	H. J. Wilson, Mansfield	...	52½	...	...	Bran. 21	ad lib.	6 6½
101	F. Sowerby, Aylesby, N. Lincolnshire	112	28	Cut Oat Sheaf.	...	...	ad lib.*	8 0½
102	Professor Low—Elements of Agriculture	140	73	...	...	Potatoes. 70†	...	9 9
103	"	140	105	...	...	...	...	12 0
104	— Binnie, Seton—H. Soc., 1850	84	70	...	500†	Linseed. 3½	ad lib.	9 9
105	W. Gater, Botley F. Club	168	...	32*	...	Pollard. 2½ bushels.	...	8 6
106	J. Twynam	112	84	16	...	...	...	10 3
107	R. Baker, Writtle, Essex	70	70	30	...	...	140	9 0
108	T. P. Dods, Hexham	ad lib.	120*	...	...	...	...	10 6½
109	T. Baldwin, Glasnevin	147	98	...	Carrots. 49	...	...	11 6
110	C. Howard, Biddenham	ad lib. ½	42	...	Green Rye. ad lib. ½*	...	...	7 6½
111	D. A. Milward, Waterford	32	70	...	Turnips. 280	...	32	8 0
112	A. S. Ruston, Isle of Ely	ad lib. ½*	84	...	Green Rye. ad lib. ½*	...	...	10 0
113	A. Simpson, Beaulieu, N. B.	168	70	14	...	...	24	10 0
114	H. J. Wilson, Sherwood, Nottinghamshire	42	37½	...	Carrots. 21	Bran. 21	ad lib.†	8 0
115	E. W. Moore, Colshill, Berks	112	63	...	...	...	ad lib.*	10 0

(3.) I have now to take from this table such particulars as will enable me, in a number of selected instances, to calculate the cost of horse keep per annum; and this I am able to do in thirty-five cases. They are arranged in the following table, in which the first and second columns give the number and authority of the case, and the last column gives the calculated yearly cost of the food described in the intervening spaces where the *numbers* of the several rations given in Table I. are quoted, with the number of weeks during which each was followed.

No.	Name.	Number of weeks (beginning Jan. 1) of each ration.	Annual Cost.		
1	Professor Low ...	4 (35), 9 (102), 9 (103), 17 (2), 4 (22), 4 (34), 5 (35) ...	£	s.	d.
2	— Binnie ...	20 (41), 6 (5), 13 (6), 13 (41)...	22	6	0
3	Wm. Thomson ...	26 (43), 13 (7), 13 (43) ...	24	14	0
4	— Barthropp ...	9 (46), 13 (45), 4 (8), 9 (9), 13 (45), 4 (46) ...	27	0	0
5	Mr. N., Gloster ...	22 (47), 17 (11), 13 (47)...	25	14	6
6	J. Morton ...	22 (48), 17 (10), 13 (48)...	26	5	0
7	W. Gater ...	13 (49), 13 (105), 13 (12), 13 (24) ...	22	2	0
8	J. Twynam ...	4 (50), 13 (106), 26 (14), 9 (50)	18	16	0
9	W. C. Spooner ...	9 (80), 18 (25), 13 (13), 8 (25), 4 (80) ...	22	12	0
10	T. Aitken ...	23 (81), 11 (3), 4 (26), 5 (27), 9 (81), ...	22	11	0
11	G. W. Baker ...	23 (82), 11 (3), 18 (82) ...	24	0	0?
12	R. Baker ...	4 (83), 9 (84), 9 (107), 17 (16), 9 (107), 4 (83) ...	18	18	0?
13	J. Coleman ...	22 (85), 15 (16), 15 (85) ...	18	5	0
14	T. P. Dods ...	6 (86), 18 (108), 10 (3), 6 (28), 7 (29), 5 (86) ...	23	3	0
15	T. Baldwin ...	9 (87), 17 (109), 13 (15), 13 (87)	26	6	0
16	J. Cobban ...	22 (88), 19 (17), 11 (88)...	18	7	0
17	S. Druce ...	22 (89), 19 (17), 11 (89)...	18	0	0?
18	C. Howard ...	17 (90), 11 (110), 11 (1), 13 (90)	19	6	0
19	J. Laidlaw ...	22 (91), 17 (7), 13 (91) ...	21	14	0
20	J. J. Mechi ...	22 (92), 13 (3), 17 (92) ...	19	10	0
21	D. H. Milward ...	9 (93), 8 (111), 13 (10), 9 (3), 13 (93) ...	20	0	0
22	E. W. Moore ...	19 (115), 11 (18), 5 (19), 10 (18) 7 (115) ...	26	3	0
23	W. Pope ...	17 (94), 22 (3), 13 (94) ...	21	15	0
24	S. Rich ...	19 (95), 24 (20), 9 (95) ...	24	2	0
25	A. S. Ruston ...	19 (96), 7 (112), 13 (1), 13 (30)	20	4	0?

No.	Name.	Number of weeks (beginning Jan. 1) of each ration.	Annual Cost.
26	H. E. Sadler ...	13 (97), 6 (103), 17 (16), 14 (103), 4 (97)	24 5 0
27	M. Sandford ...	19 (98), 20 (3), 13 (98)	16 6 0
28	A. Simpson ...	15 (99), 7 (30), 21 (3), 4 (31), 5 (99)	19 0 0
29	F. Sowerby ...	26 (101), 13 (21), 13 (101)	19 10 0
30	H. J. Wilson ...	9 (100), 13 (114), 6 (7), 7 (3), 4 (32), 9 (33), 4 (100)... ..	20 8 0

No.	Name.	Quantity of food consumed in the year.	Annual Cost.
31	Professor Low ...	Oats, 125 bush.; hay, 36½ cwt.; green food, clover, &c., £5	28 15 0
32	J. Melvin	{ Oats, 132 bu.; bran, 5 cwt.; barley, 24 bu.; grass, 3 tons; turnips, 3 tons; pasture at night 3 months... .. }	30 16 0
33	R. Baker	Oats, 64 bu.; hay, 40 cwt.; grass, &c., 7 tons; beans, 20 bush.	24 2 0
34	J. Gibson	Oats, 85 bush.; turnips, 58 cwt.; potatoes, 58 cwt.; grass, &c., 22 weeks at 5s. 3d.	22 17 6
35	J. J. Mechi ...	Oats, 68 bu.; grass, &c., ½ acre; red clover, 2¼ acres; hay, 2 tons	30 4 0

A review of these tables shows that the differences in the cost of weekly food, according to the various modes of feeding specified, are very considerable; amounting to more than 100 per cent. in the cost of summer feeding, which averages 8s. a week, and varies from 5s. to 11s.; to seventy or eighty per cent. in the cases given of autumn feeding, which costs on the average about 9s. 6d., and varies from 7s. 6d. to 12s.; to more than 100 per cent. in the cost of winter feeding, which averages about 6s. 4d., varying from 4s. 9d. to 12s.; and to thirty per cent. in the cost of spring feeding, which averages nearly 10s. a week, varying from 7s. 6d. to 12s.

I find that the average cost per week of keeping a horse throughout the year, according to the cases here described—putting the summer season down as lasting eighteen weeks, the *autumn* as six weeks, the *spring* as lasting over twelve weeks, and

the winter season as sixteen weeks—amounts to about 8s. weekly. The annual cost in some of the cases named is, however, brought out more accurately in the second table, where the average annual cost of thirty-five selected instances comes out as equal to £22 7s., being about 8s. 7d. weekly throughout the year.

It is plain that these two tables need to be studied and compared rather than merely read; and the reader must, for the most part, be left to gather in this way the information they convey, for it would take more pages than can be spared to state in words the facts of the three dozen histories which are here compendiously expressed in figures. One remark, however, may be allowed. Thus, the discrepancy ought to be pointed out which exists between the annual cost of horse keep as calculated from the detailed statements of one or two authorities, and the cost as calculated from the quantities estimated by the same authorities as being consumed during the year. Professor Low's weekly dietary costs £22 a year, while his statement of quantities consumed in the course of the year comes to £28 15s. per annum; and it is so with the reports of Messrs. Baker of Writtle, and Mechi of Tiptree. As to the relative values of the differing statements, it will, I think, be safer to accept the calculated results of the given weekly consumption than to trust to the estimated annual quantities consumed. Some of the differences (amounting to twenty-five or more per cent.) may be owing to different rates of valuation having been adopted in the two cases respectively.

The chief point, however, to which attention will be given in this table is the large difference of annual cost per head incurred under different modes of management in the maintenance of the horses of the farm. Mr. Sandford pays £16 6s. per head per annum; Mr. Melvin pays £30 16s. per annum—nearly twice as much. One must not too confidently infer from such a difference per head a similar difference in the cost of horse labour *per acre*. The less expensive method is not necessarily the cheaper of the two, as these very farms sufficiently illustrate. In Mr. Sandford's case twelve horses are used (consuming, therefore, £195 12s. worth of food, or 16s. 3d. per acre) in cultivating 240 acres of "a marl on a chalk subsoil, from six to seven inches deep." That it is well done may be inferred from the good crops grown in the year of the report, reaching forty-four bushels of wheat over sixty acres, and fifty bushels of barley on a similar extent. In Mr. Melvin's case twenty horses are employed (consuming, therefore, £616 worth of food per annum, or about 18s. 9d. per acre)

in cultivating 675 imperial acres, "part of it eight to eleven inches deep, the rest seven or eight—the lea furrow being six inches deep." It is right to add that Mr. Sandford's farm includes sixty acres of grass land, which, however, does not greatly add to the labour of the horses. But the difference between £31 and £16 6s. (eighty-nine per cent.) does not merely dwindle down to one between 18s. 9d. and 16s. 3d. per acre (fifteen per cent.); it still further diminishes when considered in connection with the quantity and laboriousness of the fallow crops in the two cases respectively. But this will more plainly appear when the other items going to swell the cost of horse labour—namely, wages of team-men, farrier's and tradesmen's bills, annual cost of keeping implements and animals good—are enumerated, and when the number of horses kept, and the extent of the different crops cultivated by them are given for comparison. My reference now to the two extreme cases in Table II., is merely to guard against the idea that the cheapest management of horses necessarily implies the cheapest production of horse power.

I may allude to some of the instances here given as agreeing remarkably in their cost per annum, all of them being adopted by excellent practical farmers, and illustrating what seems to me an economical and yet efficient style of management. I refer to Nos. 13, 16, and 17, in Table II., by Messrs. Coleman, Cobban, and Druce, where the annual cost of a horse is little more than £18, or 1s. a day, each pair working fourteen to sixteen acres of fallow crop annually.

14. Extras in the Cost of Horse Labour.—Besides the food of the horse, there is the cost of blacksmith's, saddler's, and farrier's bills, the annual loss of value by increasing age, the wages of horse men and stable boys, and the tear and wear of the implements by which the horse power is utilised in cultivation, to be taken into account; there is also the number of horses with their men kept upon the farm, to be considered before we can estimate the cost of horse power per acre on the farm. The extras enumerated above may be valued thus per horse:—Blacksmith's bill for shoeing, 30s. annually; farrier's bill, per annum, 10s.; saddler's bill, per annum, 10s.; depreciation of value, ten per cent, say £3, the whole thus reaching £5 10s. per annum. But on these points I add a number of notes received from those to whom I owe the particulars given in Tables I. and II. The numbers heading each paragraph in the following *pages are those of Table II.*, which may be referred to.

(10.) "Since I joined my father in my present occupation in 1841 I have the account of horses purchased; and as our practice has been to buy only for making up our teams, and, with only one exception, at an age to be put to work immediately bought, so that nothing is chargeable to keeping, and I consider our present team superior to what I commenced with, it is, I think, a very fair criterion. The cost of farrier will lead you to suppose we have been tolerably healthy; it includes attendance on cattle, and I believe nearly half should be charged to cattle account.

"Our blacksmith's bills include work done to machinery and fencing, &c., which does not properly belong to horse labour.

"Our shoeing will be very much less than in most localities. [It is a fen soil.]

"The saddler's account, you will see, is in excess: it includes harness for gig and riding.

"The implements are far below your estimate, though I think mine are in good order, and fully capable of well working our occupation. I have not employed either a wheelwright or blacksmith on the premises, so that all my expenditure has come in bills, and it is very easily ascertained. Our total expenditure for seventeen years is as follows:—

	Horses.			Farrier.			Blacksmith.			Saddler.			Implements.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
	678	18	0	50	12	0	370	15	7	244	13	2	550	15	0
Average per Annum, say	40	0	0	3	0	0	22	0	0	14	10	0	32	0	0

"The extras you charge £5 10s. would in our case, reckoning for twenty horses, only amount to £4; that is £2 per horse for depreciation, 3s. for farrier, £1 2s. blacksmith, 15s. saddler. On further consideration I should be inclined to put the charge for extras at £4 10s. per horse."

(14.) "My smith's account, including cast-iron shares for the plough, has not averaged £16 per annum; and my carpenter's account from £5 to £6 annually. The farrier's bill does not exceed £2 per annum, and the saddler costs £5 a year. These sums divided by eight, the number of horses [and deducting for work on implements], amount to £2. Ten per cent. on £30, the value of the horses, makes the sum in my case £5, instead of £5 10s."

(17.) "I contract with a blacksmith to shoe my horses at 10s. per horse per year, and a similar sum to the harness-maker. I

think a deduction should be made for the pasture land; the expenses on the grass portion of my farm amount, I find, to about 3s. per acre annually."

(18.) Mr. Howard contracts for the shoeing of his horses at 11s. each; the charge of 30s. for this is, in his case, too high, but it includes smith's work on repair of implements. He also keeps a pair of extra job-horses, used in busy times; all which must be borne in mind when considering the accuracy of the figures in his case.

(19.) "I believe I can say what few of your correspondents can say, that £1 per horse will cover our farrier's bill for all the seventeen years we have been farming. I attribute this in great measure to a uniform system of feeding."

(25.) "I put out my shoeing for £11 per year—twenty-nine work-horses and generally three nags. On our fen soils shoes wear out slowly."

(29.) "Your estimate of extras approximates very nearly to what I see mine cost. The following is the amount of my extras for the last four years:—

	Saddler.			Blacksmith's Contract.			Farrier's Contract.		
	£	s.	d.	£	s.	d.	£	s.	d.
1855	19	7	0	36	0	0	7	0	0
1856	14	4	6	36	0	0	7	0	0
1857	12	0	0	36	0	0	9	0	0
1858	15	12	0	36	0	0	7	0	0
	61	3	6	144	0	0	30	0	0
Per annum ...	15	5	10	36	0	0	7	10	0
Per horse ÷ 22...	0	13	10½	1	12	9	0	6	10
Amount in all				£	s.	d.			
Add for annual depreciation ...				...	2	13	5½		
				...	3	0	0		
Total amount ... ..				...	5	13	5½		

to which you are sufficiently near."

(30.) "The actual shoeing of twenty horses for eleven months has been £14 4s. 8d., which for twelve months would give £15 10s. 6d. per annum, or 15s. for a horse annually. For the same twelve months the cost of replacing the merely 'wearing parts' of ploughs, harrows, &c., has been about £25, which, I believe is below the average. This is a pretty good illustration of the character of our soil. Our farrier costs us £18 a year,

of which £10 may belong to the horses, costing 10s. yearly each."

(32.) "We reckon the annual depreciation in value of a £30 horse at £3, and of course £4 10s. on a £45 horse. The smith's accounts come to £3 10s. per pair for maintaining everything belonging to or wrought by the horses, but not furnishing anything new. The saddler's account costs from 15s. to £1 15s. per horse, according to the style and keeping of harness. Insurance per horse amounts to £1 on a £30 horse; and my experience, where horses are fully fed and hard wrought, declares it to cost that sum. My farrier's account does not reach 5s. per horse."

In addition to the expenditure in shoeing, saddlery, and the other items specified, the annual tear and wear of implements has to be considered. This may be put at ten per cent. of the value of the implements, which being estimated at 20s. per acre over the arable land, results in a charge of 2s. per annum on this account.

Lastly, the wages of team men constitutes an important extra in cost of horse power. These I give in some of the cases specified in Table II., by extracts from the reports received.

(10.) "We are giving our ploughmen 12s. per week at the present time, with house and garden free; 20s. a week for four weeks in harvest, and twenty bushels of potatoes. Last year we gave 13s. 6d., and the year before that 13s. Taking an average of years, I suppose it would be barely 12s.

The account here, therefore, stands thus:—

	£	s.	d.
Ten ploughmen at 12s. for forty-eight weeks	...	268	0 0
Ditto at 20s. for four weeks	...	40	0 0
Two hundred bushels potatoes, at 2s. 6d.	...	25	0 0
Cottages and gardens, say	...	40	0 0
		373	0 0
Deduct for harvest money and sundry employment	...	73	0 0
Charged against the horses	...	£300	0 0

I give the calculations in this case in detail, but the reader must be left to work it out for himself in the other instances:

(11.) "The ploughmen now are paid 2s. a-day. Of course their wages fluctuate according to the price of provisions. They generally get an advance of 2s. per week for four weeks during

haymaking, and they are paid 20s. a week for a month during the corn harvest; and they have the privilege of working by contract whenever opportunity offers during hay time or harvest. It will not, therefore, be fair at such times to charge the whole of their wages to the cost of horsekeeping."

(13.) "Three of the ploughmen are paid 11s. a week, and receive 36s. extra for harvest. Two boys get 7s. a week, and about 15s. extra for harvest work. No beer or extras of any kind beyond the wages. The carters groom but do not feed their horses; a regular horse-feeder is kept, who employs about half his time at this work, and is paid 12s. per week, and 32s. extra for harvest work."

(14.) "The general wage of a full ploughman has been for the last few years 15s. or 16s. a week, with from two to four bushels of wheat, the same of barley, eighty stones of potatoes, and a house free, and cartage of coals. He is bound to supply a woman-worker at 1s. a day in summer, 1s. 6d. in harvest, and 10d. in winter. Some men get less and some few more than this: my own wages are 15s. with the lesser quantities of corn."

(15.) "The ploughman's wage is 12s. a week, with a free house."

(16.) "We pay our ploughman 10s. a week."

(17.) "The wages of the ploughman are from 12s. to 14s. a week."

(18.) "My horsekeeper's wage is 12s. a week; my under ditto and ploughmen from 8s. to 10s., with double wages for the harvest month."

(19.) "The wages of the ploughmen are above the common rate of the neighbourhood: they receive 11s. 6d. in money, besides beer and extra money in harvest, also a house and garden, worth £5 a-year."

(21.) "Ploughmen get 8s. 6d. a week."

(22.) "Carters' wages 15s. a week, including rent, fuel, beer, and indulgences." (Boys' wages not stated.)

(23.) "One man and boy are allowed to a team of four horses. The ploughmen's wages are from 8s. to 9s. per week, with house, garden, fuel, and twenty perches of potato ground, and 1s. for every journey above six miles from the farm."

(24.) "Carters 15s. a week (no perquisites). Young men and boys hired by the year, from 3s. to 9s. a-week."

(25.) "We have no hiring of servants, but our ploughmen are ordinary labourers, taking the ordinary wages—just now 10s. per week; when corn is dearer, 12s. a week."

(26.) "The wage of the ploughman is usually more than that of the ordinary labourer by 1s. a week and a house rent free. And for four weeks during harvest they have double wages. Their wages for the year, including rent of house, would amount to £35 *now* (1859)."

(27.) "The waggoners have 2s. a week more than the labourers, who are now paid 11s. a week. The second man has 1s. less than the waggoner, and both have £2 10s. for harvest. The 'all-workers' have 10s. per week all the year round. The boys have 7s. per week for board, and £6 wages." (Four horses to a team.)

(28.) "The ploughmen are engaged by the year, and the money wages, with allowance of provisions (valued at wholesale prices), amount to £30 per annum, besides a cottage on the farm."

(29.) "Ploughmen about 12s. a week."

(30.) "Ploughmen's wages, 15s. to 17s. a week, except for a month in harvest, when they have from 25s. to 35s. per week."

(32.) "Ploughmen's wages may amount in all to 16s. per week, varying from 12s. 9d. to 14s. 3d., according to price of grain; namely—house, £21; 1,050 lbs. of oatmeal, 10 cwt. of potatoes, cartage of coals, and food for four weeks in harvest time."

(6.) "Head-ploughman, 13s.; the others, 12s.; boys, 6s. a week."

These particulars are given in explanation of the varying nature of these items in the cost of horse power; though even they do not convey the whole truth on the subject; for, in addition to varying wages, the number of men and boys to a given number of horses varies exceedingly. And it will be seen in the following section that the information here given goes only partly to account for the figures in that column of Table III. which specifies the wages of team men.

15. Cost of Horse Labour per Acre.—We are now in a position, with reference to the cases already specified, to ascertain the whole amount paid for horse labour on a number of selected farms; and, comparing it with the acreage of the several farms, to state the cost per acre of the horse labour on each. This is done in the following table, in whose columns are stated (1) the numbers of the cases severally quoted from Table II.; (2) the annual cost of food per horse taken from Table II.; (3) the estimated or the actual amount, given under the head of extras, of blacksmith's, saddler's, farrier's bill for horse, together with the cost of maintaining the value of the animal undepreciated; (4)

the number of horses worked upon the farm; (5) the total cost of horse-keep on the farm, as made up of food and "extras;" (6) the cost of maintaining the implements in use at an undepreciated value—viz. ten per cent. upon an estimated expenditure of £1 per acre of the arable land; (7) the amount of wages paid to team men, as calculated from the particulars supplied to me, and partly explained in sundry notes already given; (8) the total cost of horse labour on the farm; (9 and 10) the total acreage of the farm in arable and pasture land; (11 to 14) the acreage of the several crops cultivated on the arable land—fallow and fallow crops, including bare fallow, turnips, carrots, mangold-wurzel, cabbage, &c.—grain, including wheat, barley, oats, &c.—clover, including clover, sainfoin, lucerne, &c.—and pulse, &c., including beans, peas, and flax; (15 and 16) the cost per acre of arable land, and per acre of the actually ploughed land, of the horse labour of the farm.

It may be stated here, in explanation of the large amount of extras under No. 6, that they included in that case a considerable portion of the cost of implement repairs. The wear and tear of implements also, however, stand rather higher here than in the proportion which the others present to their respective acreage; the fact being, that on this farm a great deal of machinery had been tried, the repairs of which were a heavy item.

Columns 2, 3, 4, 6, and 7, give us the means of calculating the total cost of horse labour, which accordingly appears in column 8.

In columns 9 and 10 we have the acreage occupied by the tenants in the several cases specified. Of course it would be of little service to compare the total cost of horse labour with the total acreage, because much of it might be pasture, involving little labour of any kind. The extent of arable land is accordingly given, and the cost of horse labour is calculated in column 15 per acre of the arable land in every case. But even this would mislead without further explanation, and accordingly in columns 11, 12, 13, 14, will be found the acres respectively in fallow and fallow crops, in grain crops, pulse, and clover. And in column 16 the cost of horse labour per acre ploughed that year is calculated. But even these particulars are insufficient to enable a perfectly truthful comparison, for the soil may be stiff or light, and the cultivation may be deep or shallow.

Take, for instance, one of the last cases (30) in the above table. *Mr. Wilson's* farm is an extremely light sand, just enclosed out of

TABLE III.—VALUATION OF HORSE LABOUR.

1.	2.		3.	4.	5.	6.	7.	8.	9.			11. 12. 13.			14.	15.		16.		
	Annual Cost per Horse.								Acreage.		Acreage.		Cost per Acre of Horse-labour over							
	Food.	Extras.							Pasture.	Arable.	Fallow Crops.	Grain Crops.	Clover, &c.	Pulse, &c.		the Arable Land.	the ploughed Land.			
Number in Table II.	£	s.	£	s.	£	s.	£	s.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	£	s.	£	s.	
10	22	11	4	10	541	0	32	0	660	119	330	110	110	110	110	110	1	6	1	11
11	24	0	5	10	590	0	332	0	403	560	110	280	140	...	...	...	1	15	5	2
13	18	5	5	10	261	5	40	0	43	400	91	182	85	42	...	...	1	13	6	2
14	23	8	5	0	225	4	31	0	43	400	91	182	85	42	...	...	1	13	6	1
15	26	6	5	10	225	4	31	0	110	310	78	155	57	20	...	...	1	7	10	0
16	18	7	5	10	159	0	12	16	41	128	32	54	37	5	...	...	2	0	0	14
17	18	0	5	10	166	19	20	0	104	0	290	19	400	...	...	...	2	0	2	16
18	19	6	4	10	164	10	20	0	116	0	300	10	200	50	100	50	1	9	0	18
19	21	4	5	0	285	12	33	0	170	0	488	12	120	330	77	175	1	10	0	2
20	20	0	5	10	183	8	25	0	120	0	328	8	60	250	63	135	1	10	6	17
21	20	0	5	10	306	0	30	0	...	300	75	150	75	...	...	...	1	11	3	1
22	26	3	5	10	348	3	34	0	179	8	561	11	400	340	90	150	1	13	0	18
23	21	15	5	10	14	381	10	40	0	200	0	621	10	400	120	185	1	11	1	18
24	24	2	5	10	355	4	40	16	274	408	60	174	174	...	...	...	1	11	10	10
25	20	4	4	10	29	716	6	90	0	364	0	1,170	6	120	900	235	1	7	9	2
26	24	5	6	5	16	488	0	50	0	219	15	757	15	75	500	120	1	6	0	11
27	16	6	5	10	261	12	24	0	158	4	443	16	6	...	...	...	1	10	0	2
28	19	2	5	10	246	0	34	0	150	0	426	0	...	...	...	...	1	17	0	2
29	19	10	5	10	22	550	0	60	0	291	4	901	4	...	...	...	1	8	4	14
30	20	8	5	10	518	0	90	0	348	16	956	16	...	...	...	...	1	10	0	2
32	30	16	5	10	726	0	67	10	338	0	1,131	10	...	...	...	...	1	13	6	14
6	26	5	8	0	239	15	30	0	117	0	386	15	...	...	...	...	1	13	6	2
													30	50	1	12	1	12	2	16
													30	200	60	120	2	1	16	10

* The instances marked with an asterisk are those of pasture farms as well as arable. From 3s. to 4s. 6d. per acre for horse labour on the pasture should be deducted from the sums in column 8; and the remainder, spread over the arable land of the farm, will give figures more correct. For example, Mr. Baker, of Woburn, whose pasture land costs him 4s. 6d. an acre for horse labour, would thus have the figures 35s. 5d. reduced to 3s.

the heathy waste of Sherwood forest. He has cultivated it generally five to seven inches deep, excepting one deep ploughing in preparation for turnips, which is about ten inches deep; and yet a day's work at plough varies from one acre of deep work, to one and a half or even more of light fallow ploughing. The average of all sorts will be at least one and a quarter acre done daily per pair of horses in eight or nine hours. No wonder that Mr. Wilson's horse labour cost less per acre than the others, whatever his method of stable feeding may be; for heavy land cannot of course be cultivated for the same expenditure as light and sandy soil. In order, then, that the figures of these last columns of Table III. may be read intelligently, I add another series of extracts from the reports, stating the ordinary depth of cultivation adopted in the several cases, and the character of the soil. The figures numbering the paragraphs are the same as those of Tables II. and III.

(10.) "The soil is peat upon clay, over say one-half of the farm; over the remainder the clay is ploughed up, and it needs a great deal of rolling to give it sufficient solidity for the wheat crop. The ploughing may be averaged for a pair of horses to do one and a quarter acres daily. The general depth of cultivation is five inches; for, though we plough deeper for fallow, yet the peat decomposes, and we lose the depth in the course of a year, and we find it prejudicial to any other crop to plough deeper than it was fallowed."

(11.) "About 100 acres are strong land, but not so retentive as to prevent its being ploughed ordinarily with two or three horses. The remainder (460 acres) is a sandy soil. It has all usually been cultivated from five to six inches deep."

(13.) "Two hundred and sixty acres are a useful marl with stones; the soil deep enough to allow of seven-inch ploughing, and sufficiently retentive (often containing fifty or sixty per cent. of clay) to render it stiff working land in moist weather. One hundred acres are of a light and shallower soil, sometimes occupying the slopes of the hills, where we may not have more than two inches of earth. Forty acres are a strong clay marl. Three horses in line are needed for six to seven-inch ploughing. From one acre (lea ploughing) to three quarters (in winter) is a day's ploughing."

(14.) "Except seventy acres of strong soil, part of which is very steep, my farm is flat alluvial soil, partly light and partly good deep loam—all good turnip land. Fallows are ploughed

eight to nine inches deep with two horses, twelve to thirteen with three horses, whenever the land allows ; lea land is ploughed six to six and a half inches deep ; turnip land for corn five inches."

(15.) "The soil is a loamy clay, of a darkish brown colour, resting on the middle limestone formation."

(16.) "Of the soil, twenty acres are light and shallow, resting on limestone rock ; 100 are a lightish sandy loam ; and eighty are a clayey loam. We plough a foot deep for roots, four inches deep for corn."

(17.) "The character of the land is gravel, clay, and clay loam. Our ordinary depth of cultivation is from five to eight inches—never less than the former. The ordinary day's work varies from three roods to an acre, the horses working double."

(18.) "The character of the soil over 230 acres is gravel, liable in a dry time to burn ; over 100 acres a black gravel and loam. For wheat we plough four to five inches deep ; for barley four inches ; our turnip fallows from eight to nine inches. We usually expect a man with a pair in ordinary work to do his acre in the day, excepting in winter, when the fallows are laid up with four horses in a plough, and in spring, when these fallows are ploughed back, with a three-horse plough."

(19.) "The soil over most of the farm is a gravel, and on the rest a stiff clay. We plough six or seven inches deep, except for roots, when the furrow is ten or twelve inches deep."

(21.) "We use two-horse swing-ploughs, and three roods to an acre are a day's work ; on short days, of course, we must be satisfied with less."

(22.) "We have a deep loam on the west side of the farm, and can plough safely and usefully nine or ten inches ; on the south side we have a strong loam on clay, the average depth being six or eight inches ; on the east side a very useful stonebrash, cultivated six inches deep ; on the north side it is pasture. The ordinary extent of a day's work at plough is an acre ; three horses are used ploughing for beans and fallow in the autumn, two being used for all else after the first spring furrow."

(23.) "The soil varies much, and in a dry summer is very difficult to work. It is cultivated from four to six inches deep. Three horses are used in a plough for 'breaking' grass and heavy stubble, and two only for the after-ploughings. From three roods to one acre is about a usual day's work for one plough."

(24.) "Soil chiefly a light stonebrash, like most of the Cotswold district ; but there are some sand and some clay spots. It is

cultivated four to five inches deep, or more when the soil admits. Half an acre, or rather less, is a day's work, taking the average of dry and wet with the distance from the stables. Generally two, sometimes three horses are used in a plough."

(25.) "The soil on the fen farms is very light and non-adhesive; on the high lands more tenacious and heavy. Many fen farmers break up a good deal of their clean fallow lands with four or six horses in a large plough, bringing up the subsoil and mixing it with the top soil. They plough from fourteen to fifteen inches deep; but the usual depth of ploughing is, for wheat, five or six inches; and on the high lands we cultivate from six to eight or nine inches deep. Two horses easily plough five roods a day on the fen. On the high lands early in the season, two horses will plough from three to four roods per day; but in winter and spring, when the land gets wet and sticks a good deal, we usually plough with three horses at length, to avoid treading, and they plough just three roods daily."

(26.) "Three-fourths of the farm is a light chalky soil, the remainder a rather stiff red gravel resting upon the chalk. The wheat stubbles are usually ploughed about seven inches deep in the autumn by three or four horses. The average depth for wheat, barley, &c., is about five inches. An average day's work is a statute acre, done by a pair of horses abreast."

(27.) "The soil is a marl on a chalk subsoil; the depth of cultivation is from six to seven inches. An acre and a quarter to an acre and a half is a day's work—four horses to a team."

(28.) "One hundred and twenty acres are a clay mould; 120 acres peaty, on a sandy subsoil, but damp—reclaimed from swamp; fifty-five acres sharp gravel. The ordinary depth of furrow is eight inches; if subsoiled, fifteen inches.

(29.) "Soil loamy, with clay subsoil. Ploughing six to seven inches deep. Three roods a day in winter; one acre in summer by two horses."

(30.) "Soil varying from mere sand to gravelly sand, and in places many boulders. The depth of cultivation varies according to crop from five to seven inches, except one deep ploughing in preparation for turnips from ten to eleven inches. A day's work at plough varies from one acre of hard work to one and a half, or even more, of light fallow ploughing; ploughing clover lea for wheat, one and a quarter acres per day; and perhaps the average ploughing of all sorts is one and a quarter acres daily, done in eight or nine hours—two horses to a team."

(32.) "Soil medium. Lea furrow six inches deep. Part ploughed in autumn, eight to eleven inches deep, rest, say seven or eight."

(6.) "Soil, a sand over 140 acres; a clayey loam over eighty acres; a light brashy soil over twenty acres. Ploughed from five to ten inches deep, according to the crop."

Even the extremely various character of the land, and the great differences in the treatment of it, as above described, fail, however, to account for the whole of those differences in the price of horse labour per acre which Table III. describes. There is a large remainder after the amplest deductions on this ground, which must be put down either to varying stable management on the one hand, or to varying laboriousness of cultivation on the other. The number of acres cultivated per horse—*i.e.* excluding from the whole acreage of the farm, not only the permanent pasture-land, but the extent in clovers and grasses—varies exceedingly; no less, indeed, than from eighteen and fifteen, in the case of Nos. 15 and 27, to thirty-one and thirty in the case of Nos. 14 and 6. From the accounts which have been given me, there does not appear to have been that greater laboriousness of cultivation, either involuntary, arising from the character of the soil, or voluntary, arising from deeper and more frequent cultivation, which would explain such differences as appear in these tables. The further information which is to be extracted from a study of them must be left to be gathered by the reader, but it is worth while pointing out to him how the number of horses kept on a given extent of land overrules in its ultimate effect the most economical style of stable management. Mr. Sandford's horses cost him only £16 6s. each per annum for their food, *i.e.*, about half as much as those of Mr. Melvin; and yet the expenditure of the latter per acre for horse labour, high as it is when compared with the other cases on the list, is not so high as that of Mr. Sandford.

It may be added, as presenting the total result of the instances specified in this table, that we have on twenty-one farms 282 horses, costing for food, for depreciation of value, and for saddler's, farrier's, and blacksmith's bills, £7,713 a year; their implements cost £874 a year to keep them good; and the ploughmen and boys employed about them cost £4,242 a year in wages—in all, about £13,000, or £46 per horse per annum; and supposing that there are 2,500 working hours in the year, this is rather less than 5d. per horse per hour.

16. Cost of Horse Power per Cwt. of Draught.—The common definition of horse power is the ability to lift 33,000 lbs. one foot high per minute. This is perfectly consistent, as has been already said, with the results of experiments on the draught of ploughs. Thus, when two horses pull a plough along at the rate of two and a half miles in an hour, and the tension on the draught chain is equal to a lift of 300 lbs.—no uncommon case—they do in effect lift that 300 lbs. 220 feet per minute, that being the sixtieth part of two and a half miles; and this is equivalent to a lift of 66,000 lbs., or just the 33,000 lbs. apiece, one foot high per minute, which is the ordinary mechanical expression of one-horse power. This power, however, is not continuously exerted. The plough, though drawn at the rate of two and a half miles per hour, is not drawn twenty-five miles in a day of ten hours; it is not often drawn much more than ten miles in that time, in consequence of loss of time on headlands, &c. In fact, the plough is drawn barely ten miles in turning over one acre in furrow-slices ten inches wide. In this lies one great difference between animal and steam power, namely, the persistence of the latter, if only methods of continuously employing it can be devised. The really effective work of a horse per diem thus does not much exceed one half of that calculated from its work per minute; and its annual performance must be often still further reduced below the theoretical standard by the occurrence of days when it remains idle in the stable.

In some of the instances described above, I have received such a detailed account of the work done upon the farms, as enables me to estimate with some confidence the *total* annual draught accomplished during its cultivation. The following, for instance, were the details of cultivation on my father's farm at Whitfield. On 120 acres of it wheat was annually grown; the cultivation of this consisted of one ploughing, three harrowings, one drilling, one rolling, the carting of the produce (two tons per acre) three-fourths of a mile to the homestead, and the carting of some 100 tons of grain perhaps six miles to market. On sixty acres of root-crops there were one deep ploughing, and probably two shallower ploughings, three "cultivatings," probably ten harrowings, two rollings, twice ribbing when covering the manure, one drilling, three horse hoeings, the carting of fifteen tons of dung per acre to the land, and the carting of twenty-five tons of produce from the land three-fourths of a mile. On thirty acres of clover there was *one rolling*, and the carting of fifteen tons of green food per acre

from ten acres, and the carting of twenty tons of hay off ten acres three-fourths of a mile. On thirty acres of beans there were two ploughings, two "cultivatings," four harrowings, one drilling, two horse hoeings, ten tons of dung per acre carried three-fourths of a mile, two and a half tons per acre of produce carried home three-fourths of a mile. I have the number of miles walked per acre in performing every operation, and I can from experience and experiment pretty nearly estimate the draught in every case. In the case of produce and manure carried I add the weight of the cart going and returning, which just doubles the quantity of cartage; and ten per cent. is charged upon the weight for draught, this being what seems to me fair, on comparing Mr. Brunel's experiments on this subject with the ordinary character of cartage on the farm.* It is plain that in all these particulars I have the complete history of the labour of cultivating and carrying the crops of the farm, which accordingly is given in the table on the next page.

These figures represent the cwts. drawn (= lifted) one mile in the several operations; and, adding them together, we have the annual labour of the farm, which amounted, in the case before us, to 37,006 cwts. drawn (= lifted) one mile per annum. For the words "per annum" we may substitute 300 days of nine hours each, and the work done will be found on calculation to have been equal to the lift of 135,085 lbs. one foot high per minute during all that time; which, as seven horses were employed, was 19,298 lbs. apiece, or above one-half the theoretical quantity—a very high average, however, as will appear from what I have already said. In order to ascertain the cost of horse power in this case, we must assume a rate of movement natural to the draught animal—say $2\frac{1}{2}$ miles per hour. The work done was 37,006 cwts. drawn (= lifted) one mile in 2,700 hours: this is equivalent to 14,802 cwts. drawn $2\frac{1}{2}$ miles in 2,700 hours, or $5\frac{1}{2}$ cwts. drawn that distance every hour. But the cost of horse labour on this farm was £386 15s. per annum, or 2s. 10d. per hour—that, then, was the cost of drawing (= lifting) $5\frac{1}{2}$ cwts. $2\frac{1}{2}$ miles in that time. Horse power on Whitfield farm thus cost as nearly as possible 6d. per cwt. drawn $2\frac{1}{2}$ miles at that rate of

* He found that the draught on a dry good road was three per cent. of the weight; on a wet good road it was four per cent.; on hard compact loam it was five and a half per cent.; on ordinary bye-roads it was ten and a half per cent.; on a newly-gravelled turnpike-road it was fourteen and a half per cent.; and on a loose sandy road it was more than one-fifth, or twenty per cent. of the weight.

HORSE LABOUR ON WHITFIELD FARM.

Crops.	Acreage.	Ploughed.		Cultivated.	Harrowed.	Rolled.		Ribbed.	Drilled.	Horse-hoed.	Dung Carted.		Produce Carted.		Equal to 1 Carting 1 Mile.
		Deep.	Ordinary.			Acres.	Acres.				Tons.	Miles.	Tons.	Miles.	
Roots ...	60	60	120	Acres. 180	Acres. 600	120	120	120	60	180	900	$\frac{1}{2}$	1,500	$\frac{1}{2}$	Tons. 1,800
Corn ...	120	...	120	...	480	120	...	...	120	...	...	...	240	6	780
Clover ...	...	...	...	...	...	30	...	...	...	...	...	...	100	6	127½
Beans ...	30	...	60	60	120	...	...	...	30	120	300	$\frac{1}{2}$	150	20	281½
Total ...	...	60	300	240	1,200	270	120	120	210	300	...	...	...	...	2,989
Multiply by the miles walked per acre ...		8	10	3	1½	2	3	3	2	3	Add for weight of carts ... 2,989				
Miles walked ...	...	480	3,000	720	1,500	540	360	420	900	...	5,978				
Multiply by the draught in cwt.		5	3½	4	3	2	3	3	1½	...	10 per cent. on which is				
Cwt. of draught ...	...	2,400	10,500	2,880	4,500	1,080	1,080	1,260	1,350	...	11,956 cwt. drawn 1 mile.				

movement. If the ploughing of an acre was equal to lifting 3 cwts. ten miles, then, by horse power it was done for 6s.; if it was equal to lifting 5 cwts. eight miles (I name fewer miles, because the greater draught implies greater depth of ploughing, and deeper ploughing involves a wider furrow-slice), then it cost 8s. per acre. And these are the figures with which, if it were desired to ascertain the gain of substituting the power of steam for that of horses, an engineer would have to compare the performance of his engine.

Take now the case of Mr. Melvin's farm. In order to understand some of the figures in the cartage columns of the following Table, it is necessary to extract the following particulars from Mr. Melvin's Report. "There are 1,600 tons of manure carted two miles. Three-fourths of the grain is carted ten miles, one-fourth $3\frac{1}{2}$ miles; forty-eight tons of linseed or other cake are carted twelve miles; 120 tons of coal are carted eleven miles." (Table on next page.)

The figures on the table, let me repeat, represent the cwts. drawn (=lifted) one mile during the several operations annually; and, adding them together, we have the annual labour of the farm equal to 107,900 cwts. drawn (=lifted) one mile per annum; or substituting for the year 300 days of nine hours each, the work done will be, according to calculation, equal to the lift of 393,875 lbs. one foot high per minute during all that time, which, as twenty horses are employed, is 19,693 lbs. apiece, somewhat more than on Whitfield farm, and a very high average performance indeed. The work done annually corresponds to 43,160 cwts. lifted $2\frac{1}{2}$ miles per annum, or 15.98 cwts. per hour during the year. Now Mr. Melvin's horse labour costs him £1,131 10s. a year, or 8s. 4d. per hour during the year. Horse power in his case, then, costs rather more than 6d. per cwt. drawn (=lifted) $2\frac{1}{2}$ miles, at the rate of movement specified. If his horses walk eight miles in ploughing an acre with a five cwt. draught (which indicates very deep and heavy work), the work is done for 8s. per acre.

It is plain that the instances I have given must be taken rather as illustrations of the mode of calculation to be adopted than as conveying what is absolutely true of the two cases specified. That there are many unavoidable liabilities to error in these calculations I readily admit; but that they give an approximation to the truth will, I suppose, be generally admitted.

If you can enumerate all the operations on your farm, together

HORSE LABOUR ON MR. MELVIN'S FARM.

Crops.	Acreage.	Ploughed.		Cultivated.	Harrowed.	Rolled.	Ribbed.	Drilled.	Horse-hoed.	Dung Carted.		Produce Carted.		Equal to Carting 1 Mile.
		Deep.	Ordinary.							Tons.	Miles.	Tons.	Miles.	
Potatoes ...	30	Acres. 30	Acres. 60	Acres. 180	Acres. 30	Acres. 90	Acres. 90	Acres. 90	Acres. 60	600	1 1/4	180	4	Tons. 1,545
Turnips ...	95	95	95	950	190	190	190	95	285	1,615	1 1/4	1,800	1 1/4	2,920
Beans ...	50	...	50	400	50	100	...	...	50	850	1 1/4	125	10	1,620
Corn ...	300	...	300	1,800	300	...	...	...	...	30	12	225	10	2,870
Clover, &c.	50	...	...	...	50	...	...	...	...	...	...	75	3 1/4	987
Pasture ...	150	...	...	...	...	...	...	...	Dung Coals Cake	1,600 120 48	2 11 12	...	...	3,200
Total ...	675	125	505	175	3,330	620	380	95	395	...	...	...	...	15,038
Multiply by the miles walked per acre ...	...	8	10	3	1 1/4	2	3	3	3	Add for weight of carts ... 15,038				
Miles walked ...	...	1,000	5,050	525	4,162	1,240	1,140	285	1,185	10 per cent on which is				
Multiply by the draught in cwt. }	...	5	4*	4	3	2	3	1	1 1/2	60,152 cwt. drawn 1 mile. †				
Cwt. of draught ...	...	5,000	20,200	2,100	12,486	2,480	3,420	285	1,777	30,076				

* Mr. Melvin's ordinary depth of ploughing is somewhat greater than it was on Whitfield farm, and I estimate the draught a little higher. Two ploughing are put down against potatoes—the labour of ploughing then up, &c., being assumed to equal to one.

† I would have reduced the per centage here, as so much of it is on the turnpike road, but Mr. Melvin's farmstead is on a height, which makes the draught heavier than it would otherwise be.

with the draught incurred in accomplishing them, then you can easily convert the whole into weight lifted through a certain space in a certain time. If you can record the cost of horse food, of extras, of ploughmen, and of keeping up live and dead stock, then against the work done you can place the exact cost of doing it; and the comparison leads, as in the two cases worked out above, to the cost of horse power "per cwt. of draught, at a given rate of movement."

It would be tedious to examine in detail the other instances given in Table III.; but I may add here, as the result of such an examination, that I believe the following Table describes pretty nearly the experience of those whose names are given:—

Number on Table III.	Name.	Performance per Horse, i.e. lbs. lifted 1 foot per Minute.	Annual Labour.		Cost of Horse Labour.		Cost of Horse- power per cwt. drawn 2½ miles.
			Cwt. drawn 1 mile per Annum.	Cwt. drawn 2½ miles per Hour.	Per Annum.	Per Hour.	
		lbs.	cwt.	cwt.	£ s.	s. d.	d.
10	Aitken ...	18,250	100,000	14·8	873 0	6 5½	5½
13	Coleman	14,354	44,000	6·5	471 5	3 6	6½
19	Laidlaw*	16,052	30,800	4·5	328 8	2 6½	6½
30	Wilson ...	16,957	93,800	13·88	956 16	7 3½	6½
32	Melvin ...	19,693	107,900	15·98	1131 10	8 4½	6
6	Morton ...	19,298	37,006	5·5	386 15	2 10	6

These figures, let me repeat, are necessarily mere approximations to the truth. They are given, of course, without regard to any personal bearings they may have, simply as the results to which calculation, on the data furnished to me, has led. No doubt exception may be taken to many of them; they may, however, be safely taken, both as illustrating the way in which the cost of horse power must be calculated, and also as showing that very considerable differences do exist in the expense of horse labour as it is managed on different farms.

* Mr. Laidlaw told me he sometimes draws 700 or 800 loads of Severn mud 1½ miles in the course of the summer; and this is here added to the work of the farm, and does, of course, increase the performance of his horses.

IV. THE LABOURER.

It is proposed in this chapter (1.) to estimate the comparative cost of mere labour as done by hand power, and steam, and horse power respectively; (2.) to state what may be called the altered incidence of farm labour as regards the different powers now used in its accomplishment, *i. e.* the alteration in the shares of it which now fall to them respectively, and this will explain the increasing demand for the services of the agricultural labourer; (3.) to state the actual wages at present paid under several methods, and in different parts of the country; (4.) to describe the modes of hiring labourers on the farm; and (5.) to discuss that relation of master and servant by which the best economical and the best social result may be obtained.

17. Economy of Hand Power.—The following four instances must suffice in illustration of the cost of manual labour engaged in mere work, *i. e.* where the least degree of skill is called for.

(1.) A man will dig eight perches of land, or say 2,000 square feet nearly a foot deep in a day. In doing so he lifts probably three-quarters of it through about a foot in height, that is to say, he lifts 1,500 cubic feet, weighing at least 150,000 lbs. one foot high in ten hours' time, and to do it therefore he must maintain upon the average a lift of 250 lbs. per minute all that time. Of course, in addition to the mere lift there is the labour of cutting off this earth from the firm ground to which it was attached. In my second case, then, this portion of his labour is very much reduced. (2.) Three men will lift 100 to 120 cubic yards of farm-yard dung, and fill it into carts in ten hours' time. The thirty-three to forty cubic yards which fall to each man's share, at twelve to fourteen cwt. a-piece, weigh 50,000 lbs., and this is lifted over the edge of the cart, or four feet high—equal to 200,000 lbs. lifted daily one foot high, or 330 lbs. per minute. This is one-fifth more than in the last case. (3.) Now take a third instance, in which there is no labour in detaching the weight from any previous connection: A man will pitch in an hour's time an acre of a good crop tied in sheaves, to an average height of full six feet, on the cart or wagon. Straw and corn together such a crop will weigh more than two tons, say 5,000 lbs. In doing this he therefore lifts 300,000 lbs. one foot high in ten hours' time, or 500 lbs. per

minute. (4.) My fourth case is of much the same kind. One man, and five boys or women, equal as regards wages, and I will therefore assume equal as regards power, to three men, will throw into carts upon an average three acres of a good crop of swedes and mangold wurzels, say seventy tons in all, in a day of nine hours' length. They lift these 150,000 lbs. four feet, being equal to 600,00 lbs. one foot; or 200,000 lbs. apiece in nine hours' time, which is about 370 lbs. a minute.

These four cases indicate the mere force of a man then, at a cost of say 3d. an hour, as equal to a lift of 250, 330, 500, and 370 lbs. per minute; the two former being cases where the load has to be detached as well as lifted, and the third being performed under the influence of good harvest fare.

But now compare this even in its best case with the duty of the steam-engine, namely, the lift of 33,000 lbs. one foot high per minute for 3d. or even less per hour; and compare it with the actual average performance of the horse, 16,000 to 19,000 lbs. lifted one foot per minute for 5d. an hour. In order at the best rate named to do the work of the steam-engine, sixty-six men would be required at a cost not of 5d., but of more than 15s. per hour, and in order to do the work of the horse, thirty-two men would be needed, at a cost of 8s. instead of 5d. an hour. It is plain that if we can take much of the mere labour of the farm out of the hands of the labourer, and put it into the hands of steam power for its performance, there is an enormous amount of saving to be made in the cost of agricultural production. It is plainly folly in the labourer to think that as regards the *mere* labour of the land he can compete with either steam power or horse power. Strength of body is desirable, and sinew hardened by long practice in hard work has a considerable marketable value; for that, however hardly it may sound, is the aspect of the matter in which the interests of the labourer most directly appear; but it is clear that for sheer lift and the mere putting forth of force, horse power, and still more that of untiring steam, must grind the soul out of any body that shall pretend to competition with it. It is in the cultivation not so much of mere strength of body as of skill and intelligence that the safety of the labourer lies, and in his capability of education he is perfectly secure.

As the matter at present stands, then, and confining ourselves to that large and increasing class of operations in which the power required is great and the process almost uniform, and

looking only to the cost per unit of work done, it is plain that steam power stands first in the race, horse power is a tolerably good second, and the agricultural labourer is literally nowhere.

18. Incidence of Farm Labour.—But consider now how this superiority of elemental and of animal power comes in by the aid of machinery to affect the incidence of farm labour. A general reference has been made to this subject in a former section; and a very general reference is all that can be made to it here. It might be possible to take the case of any specimen farm, and compare its labour account now with those of a century ago, and see how, notwithstanding the immensely increased production of the land and the increased quantity of force of all kinds needed on it, yet the actual power put forth directly by the labourer is diminished. It may well be that on the land which shall nevertheless be paying the most wages per annum, all grubbing and all heavy hoeing, all mowing and reaping, all threshing, and all cutting up of roots and hay for food, are done by horse or steam power, leaving little of mere labour for the hand, except the lifting of the produce from the ground. The great demand for labourers on the farm is now for work which requires skill and carefulness, rather than mere bodily strength. Men are wanted now for clever management of tools and of machinery; for attendance on the steam engine and the horses by which these are drawn or driven; for detailed cultivation of the plants whose produce is desired in the field; and for detailed care and management of the live stock by which a portion of that produce is consumed. And yet, limited as to quality as is the labour now required upon the farm, the quantity needed of it is enhanced so much by the more vigorous cultivation which the land now receives, that more labourers are needed now than when nearly all the work was done by men alone. So much more land has now been broken out of pasture; so much less of the arable land is each year in clover and grasses; so much more of potatoes, and of mangold-wurzels, and turnips, and crops of that class, all of them laborious, are grown; so much more stock consuming the extra provision of cattle-food needs care—that though steam power is a clear addition to our resources, and horse power is by machinery now used for purposes once wholly served by hand, yet there is more work than ever for the labourer, and work demanding a better education for the men employed in it.

Here are we producers and consumers, 21,000,000 of people, *living in this island*, on a great farm, which, by the help of such

statistics as we possess, we may describe as nearly 18,000,000 arable acres, and probably 12,000,000 grass, employing as farm labourers, in-doors and out, about 930,000 men and 120,000 women, besides 300,000 lads and 80,000 girls, or averaging them by their probable wages, as has been done before, let us say equal in all to 1,150,000 men, or one to every seventeen acres of arable and nearly as much pasture. We feed and use some 1,500,000 horses, of which probably 800,000 are strictly for farm purposes. We are annually inventing and manufacturing labour-saving machines at an extraordinary rate; and every year at least 10,000 horses are added to the agricultural steam power of the country, which must certainly displace both animals and men to some extent. We have taken the flail out of the hand of the labourer, and the reaping-hook is going; on many a farm he no longer walks between the handles of the plough—he no longer sows the seed—he does but a portion of the hoeing and the harvesting—and yet so far from being able to dispense with his assistance, he is more in demand than ever he has been. Agriculture is, in fact, experiencing the truth taught in the history of all other manufactures—that machinery is in the long run the best friend of the labourer. It is facilitating and cheapening production, and thus promoting the general good; and labourers are realising what their masters too have lately learned, that a share in the general prosperity is worth more than the exclusive advantages conferred by a monopoly.

In every county there used to be many farms almost wholly pasture, divided by frequent, wide, and straggling hedges, and covered with scattered trees. They kept perhaps a single cow and a sheep or two, or some young stock, to every four or five acres of land, and they needed a couple of men with a little additional help at harvest time to every 100 acres. On these farms, more thoroughly cultivated now, 40s. or more per acre are now spent in wages alone, equal to the employment, at better wages too, of more than three times as much hand power as formerly, notwithstanding that much more horse power is also used, and steam power has been introduced. Over whole counties the extension of potato culture has created an increased demand for labourers. Over the whole island the introduction of guano and other concentrated manures has induced a more profitable and therefore more laborious cultivation. In many districts the change of a rotation—as for example, the retention of grass and clover only one year down instead of three, and the substitution of wheat and

perhaps mangold-wurzel for a second and third year's pasture—has created more need of steam power to thresh the increased produce, of horse power to cultivate the increased arable land, of hand power to superintend and manage the detailed cultivation of the crops, their ingathering and consumption. There is much more grain grown now than used to be, but the food for stock upon a diminished extent of land has much more rapidly increased than even that of grain; and the labour now required is that of men whose competency and skill may be trusted rather than whose mere brute strength may be wielded.

19. *The Price of Labour.*—The fact, whatever the explanation of it be, that labourers are in greater demand now than ever they have been is plain, from the increased rate of wages which their services everywhere command; and from the frequent discussions before Farmers' Clubs as to the best methods of obtaining and retaining their services. Thus at a meeting of the Oxford Farmers' Club, Mr. Mein, who was lately the agent to the Duke of Marlborough, read a capital paper on this very subject. His method of obtaining more men was none the less sensible for its simplicity: it was just to *offer high wages*. And this is, I presume, essentially the solution of the difficulty.

He said in effect: We have not provided constant employment nor wages at which a comfortable living can be had, and no wonder that our men have brought up their children to other trades to be better paid; we have not paid young men wages corresponding to their ability; married men have been paid at one rate, and young unmarried men have been paid at another and much lower rate; they have thus been treated as children, and no wonder they have left us. Our remedy is to improve the condition of the labourers in their cottages; to give them more regular employment and better wages (it resolves itself into this, whether a farmer upon 400 acres had better spend £100 more in labour during winter, or lose £200 at harvest time in shed and damaged corn); to give the labourers more task work, and allow them to earn fair prices at it, simply according to their ability; and lastly, on occasions of unusual pressure to give unusual wages. Even at harvest, hitherto, he said, "our prices have not been anything to compare to the daily wage of the tradesman; nay, not enough to induce Paddy to join us in this district." And probably there never was such a harvest as that of 1859, to which he then referred, for the difficulty of procuring *harvest-men*; nor was there ever before such a harvest (and this

adds force to the illustration thus given of the scarcity of labourers) for the quantity of grain cut down by machinery.

But let me state in figures what the actual rise has been in the value of farm labour.

In the autumn of 1849, I applied through the correspondents of the *Agricultural Gazette* for information on this subject, and from most of the English counties and many of the Scottish ones I obtained answers to printed questions, as to what is the present wage of able-bodied men, what is their weekly wage at harvest time, what is the ordinary daily wage of women in the field; what is the cost of mowing clover, of mowing meadow grass, of mowing barley, of harvesting a good ordinary crop of wheat; what is the ordinary rent of cottages, and so on. Nineteen years after this, *i.e.* within the past few months, I have done the same thing again, and have been told the rate of wages by upwards of 100 gentlemen residing in twelve Scottish, thirty-five English, and several Irish counties. There is thus the opportunity of making a very fair comparison of wages at a sufficient interval of time.

Let me first quote a few instances, taking the weekly wage of an ordinary able-bodied man as the criterion.

In Aberdeenshire, Mr. M'Donald, of Huntly, reported the wages of ploughmen in 1849 to be £16 a-year with board and lodging; they are now £22 to £24 with board and lodging. Mr. Bell, of Ferryden Farm, Forfarshire, formerly reported the ordinary weekly wages of an able-bodied man at 10s.; he puts it now at 12s. in winter, and 15s. in summer. Similarly, Fifeshire wages were 10s.; they are now 14s. In East Lothian the wages were 10s. a week, or 10s. with coals hauled free; latterly they are valued at 12s. to 15s., &c. In Mid-Lothian Mr. Melvin reported the annual wages of the married ploughmen at 910 lbs. of oatmeal, twelve cwt. of potatoes, two meals daily during harvest time, the hauling of four tons of coal, and £17 in money; he has since reported them at 1,050 lbs. of oatmeal, eight cwt. of potatoes, four weeks of harvest food, coals carted, house rent free, and £21 in money. Go now to the south of Scotland, and in Wigtonshire Mr. Caird reported wages nineteen years ago at 9s. a week; they are now put at £13 to £15 a year, with 120 to 130 imperial stones of oatmeal, four tons of coals, two to three bushels of potatoes planted on the master's manure, and house and garden free. A woman's daily wage was 8d., it is 10d. to 1s.

In Northumberland, wages, according to Mr. Grey of Dilston,

were 12s. weekly, with cottage and garden, and carriage of coals free; they now are 15s. with house and garden free; and Mr. Dods, of Hexham, gives to good ordinary labourers 16s. a week, besides six bushels of wheat, four bushels of barley, eighty stones of potatoes, land to plant ten stones of potatoes (about one-tenth of acre), with free house, garden, and coals carted. Mr. Drewry's wages at Holker, North Lancashire, were 13s. 6d.; ten years later they were 15s. to 16s. 6d. Mr. Evans, of Wigan, in South Lancashire, reported wages to be 12s. a week; Mr. Twining, in the same neighbourhood, afterwards reported them at 14s. From Lincolnshire I had four reports of the wages of able-bodied men, and they ran thus:—10s., 9s. to 10s., 11s. to 12s., and 9s. to 10s. I had four reports from the same employers in 1859, and they ran thus:—12s., 12s., 12s., 10s. to 12s.; and in 1868 two correspondents have reported them as 9s. weekly, with board wages, or 15s. a week without board.

Mr. Spencer, of Knossington, Leicestershire, told me nineteen years ago that 8s. to 10s. were the wages of the able-bodied men, and he put them eleven years later at 11s. to 12s. Take, now, the case of Norfolk: Mr. Cubitt, of North Walsham, nineteen years ago put the wages at 7s. to 8s., and the carters 1s. to 2s. extra; in 1860 they were 9s., and the carters 10s. 6d. In Northamptonshire, Mr. Grey, of Courteen Hall, Northampton, reported 8s. and 9s. as ordinary wages; he put them, eleven years later, at 12s. weekly. In Warwickshire, Mr. Burbury, of Kenilworth, who reported 8s. to 9s. weekly in 1849, reported 11s. in 1859, and 14s. in 1868. In Worcestershire Mr. Hudson of Pershore, who named 8s. formerly, said, nine years ago, 10s., or 9s. with two quarts of beer a day, were ordinary weekly wages, and now they are reported at 13s. to 16s. in the same locality.

In Oxfordshire, Mr. Druce, of Eynsham, stated 8s. weekly, the carters and the shepherds having cottages rent free in addition; wages in 1859 were 10s. to 12s., ploughmen and shepherds from 12s. to 15s. with cottages.

In Wiltshire, the worst paid county in the kingdom, wages were, some nineteen years ago, 6s. to 7s. a week for ordinary labourers; they were 8s. a week in 1859; and now they are 11s. and 12s. weekly.

In Kent they were 9s. and 10s., and again 11s. to 12s., now 16s. From Sussex I had three reports formerly 8s. to 10s., 10s., and 10s.; and I had three reports afterwards, 11s., 11s., and 12s. *I have two reports now, 14s. and 15s.*

From Dorsetshire I had five reports, averaging 7s. and 8s. a week, with cider or beer, and with cottage free "in some cases." I have two reports in 1868, the one names 9s., and the other says the payments make the money equal to 12s. weekly.

In Devonshire the wages were 8s. to 10s., and now 11s. to 12s. In Cornwall they were 8s. to 9s., and now 12s. In 1868 the wages of an able-bodied ploughman are declared as equal to 19s. a week.

All this proves, then, that the labouring force in agriculture is better paid than it used to be, and that the enormous extension of machinery and of steam power lately has not been to the injury of the farm labourer.

Instead, however, of quoting a succession of instances I will give, in as condensed a form as possible, the information I have received of the present value of agricultural labour. (See pages 77—81). When more than one return for the same county are given they are from different districts. The figures in the several columns are to be read in connection with the information given in foot notes (pages 80, 81) to which the index figures refer. The last column, K, of the table will be read with interest as indicating the general rent of the labourers' cottages in the several districts.

The reader must be left to himself to compare and contrast the condition of different localities, as regards the state of the labour market, by a comparison of the figures in the following table. It is plain that wages depend on the relation between the number of the resident labourers and the quantity of the employment for them. In some parts of Wiltshire they may be only 9s. or 10s. a week, while in other parts of the island they are nearly twice as much, and it is of course of the greatest importance to let these discrepancies be as widely known as possible.

It has been urged that it is more economical to pay liberal wages; and employers have said that they cannot *afford* to employ men for less than half-a-crown a day. It is declared that when we compare steam, and horse, and hand power together, the powers in question are not the engine, horse, and man, but the food which each consumes; and their relative economy therefore depends on their being fed properly and well. That the high-waged, well-fed labourer is really a cheaper source of power than the poor and half-starved man is no doubt true, and the only pity is that labourers have been so tied to parishes that wages do not naturally become more uniform in the country.

But the fact is that farmers have no choice of this particular "machine." They *cannot*, if they would, employ only a few, and "feed" them well. Those in any parish have to maintain all in that parish, either in the field or in the work-house, and in some populous parts if they were to be "fed in order to their efficiency," they would eat up the whole produce of the land. It is plain that labouring men cannot be considered and cannot be treated by their employers as machines to be "fed," in order to obtain as large a "duty" from them as possible. It is upon their acquiring independence and manliness enough to seek for themselves the best circumstances of the country that the prospects of labourers in dense as well as scanty populations depend. Wages are the natural result of the relation of the labouring population to the labour offered them: and being bound to maintain that population, whether we employ them or not, it is probable that the rate of payment which naturally arises out of the circumstances is the best possible for all parties under those circumstances.

20. Mode of Hiring and Paying Labourers.—Besides the amount of wages there is the mode of paying them, which greatly affects the character and position of the labourer. It may be (1), partly in money, but with an immense variety of perquisites; it may be (2), partly in board and lodging in the house; it may be (3), in money solely. These three include, I believe, all the various systems of payment adopted.

1. Of the first I give two instances from the extremes of the island, Forfarshire and Dorsetshire. A Forfarshire correspondent writes to me as follows:—

"Our ploughmen receive per annum £18 to £20 in money, 6½ bolls oatmeal (140 lbs. a boll); 1½, Scotch, pint warm milk (3d. a pint during summer six months, 1 pint in winter ditto); 15 cwt. potatoes, and house and garden at say £3. This for a married ploughman. Unmarried: £20 and £22; one pint of warm milk daily all the year; 6½ bolls of meal, and fire and lodging in a bothy. At hay and corn harvest they get two bottles of beer daily, and bread and beer while leading to the stackyard. Married men get all their fuel driven by their masters."

I value those wages at 14s. to 15s. weekly. The daily workers, when getting something like steady work, have 12s. a week in winter, and 15s. in summer, with no beer or other allowance.

THE VALUE OF AGRICULTURAL LABOUR, 1863.

Column A gives the present weekly or annua wages of able-bodied ploughmen. Column B gives the wages of shepherds. Column C gives ordinary wages of common labourers, either weekly or daily. Column D gives the ordinary wages of women working in the field. Columns E and F give the wages of men and women respectively in harvest time—by week, day, or month. Columns G H I give the price per acre of cutting and tying wheat, and of cutting clover and mowing meadow-grass respectively. Column K gives the rent of labourers' cottages. The first column in the page gives the county. The information is in every case from gentlemen farming in the several counties.

COUNTIES.	No.	A	B	C	D	E	F	G	H	I	K
ABERDEEN ..	1	22 ^l . to 24 ^l . with victuals	20 ^l . to 22 ^l . with victuals	13 ^s . to 16 ^s . 13 ^s . to 16 ^s .	8 ^l . to 13 ^l . with vict ^{ls} .	3 ^l . to 4 ^l . with vict ^{ls} . 20 ^s . to 25 ^s . ⁹	3 ^l . to 3 ^l . 5 ^s . with victuals. 2 ^s . 6 ^d . to 2 ^s . 9 ^d.	.....	.....	.....	2 ^l .
PERTH ..	2	18 ^l . to 20 ^l . ¹	.....	13 ^s . to 16 ^s .	1 ^s .	3 ^s . with victuals.	2 ^s . 6 ^d . to 2 ^s . 9 ^d .	10 ^s . to 12 ^s .	3 ^l . to 4 ^l.	.....	2 ^l . to 3 ^l .
FIFE ..	3	14 ^s .	14 ^s .	13 ^s .	1 ^s .	3 ^s . with victuals.	2 ^s . 3 ^d . with victuals.	.....	.....	.....	2 ^l . 2 ^s .
STIRLING ..	4	22 ^l . to 28 ^l . and board.	18 ^l . to 25 ^l . ²	22 ^s . 6 ^d . to 3 ^s .	1 ^s . 3 ^d . to 1 ^s . 6 ^d .	4 ^l . 6 ^d . to 5 ^s .	2 ^s . to 2 ^s . 6 ^d .	12 ^s . to 16 ^s .	3 ^s . to 3 ^l . 6 ^d .	4 ^l . to 4 ^s . 6 ^d .	2 ^l . to 4 ^l .
AYR ..	5	Engaged yearly. ³	.....⁴ (¹)	2 ^s . to 2 ^s . 6 ^d .	11 ^d .	1 ^s . 5 ^s . and board.	2 ^s . to 2 ^s . 4 ^d . a day.	10 ^s . to 12 ^s .	4 ^s .	4 ^s .	50 ^s . to 60 ^s .
WIGTON ..	6	13 ^l . to 15 ^l . ⁵	13 ^l . to 15 ^l . ⁵	2 ^s .	9 ^d . to 1 ^s .	3 ^l . with victuals.	.....	10 ^s .	3 ^s .	4 ^s .	2 ^l . to 3 ^l .
NORTHUMBER- LAND	7	17 ^s .	15 ^s .	14 ^s .	1 ^s .	17 ^s . 9 ^d .	7 ^s . 6 ^d .	17 ^s . to 18 ^s .	4 ^s . 6 ^d .	4 ^s . 6 ^d .	1 ^s . to 2 ^s . 6 ^d .
	8	15 ^s . ⁶	18 ^s . to 25 ^s .	15 ^s . & 16 ^s .	1 ^s .	4 ^s . ⁷	2 ^s . to 3 ^s .	All by machine.	All by machine.	All by machine.	Rent-free.
	9	16 ^s . to 18 ^s . ⁷	12 ^s . 6 ^d . ⁸	2 ^s . 9 ^d . 8 ^o 3 ^s . 6 ^d .	1 ^s .	24 ^s . to 28 ^s .	12 ^s . to 15 ^s .	10 ^s . to 15 ^s .	3 ^s . to 5 ^s .	3 ^s . to 6 ^s .	2 ^l . to 5 ^l .
YORK ..	10	14 ^s . and overw ^{rk} paid.	15 ^s . ⁹	14 ^s .	5 ^s .	2 ^l . extra. ⁹	1 ^s . 6 ^d .	All by machine.	All by machine.	All by machine.	3 ^l . to 6 ^l .
	11	8 ^l . to 18 ^l . with lodging and rations.	13 ^s . 6 ^d .	12 ^s . to 13 ^s .	9 ^d .	21 ^s . and rations. ⁹	.....	.....	4 ^s .	4 ^s .	3 ^l . 10 ^s . to 4 ^l .
LINCOLN ..	12	9 ^s . weekly, board wages.	12 ^s . to 14 ^s . ¹⁰	13 ^s . 6 ^d . to 15 ^s .	1 ^s . to 1 ^s . 2 ^d.	.....	.....	14 ^s . to 16 ^s .	3 ^s . to 4 ^s.	.....	2 ^s . to 2 ^s . 6 ^d .
	13	15 ^s .	48 ^l . per year.	15 ^s .	1 ^s .	20 ^s.	.....	10 ^s . to 12 ^s .	2 ^s . 6 ^d .	2 ^s . to 3 ^s . 6 ^d .	4 ^l . to 5 ^l .

COUNTIES.	No.	A	B	C	D	E	F	G	H	I	K
NORTH LINCOLN	14	13s.	13s.	13s.	6s. 6d.	21s. ⁹	.....	10s. to 18s.	2s. 6d. to 3s. 6d.	3s. 6d. to 6s.	4l. to 5l.
SOUTH LINCOLN	15	16s. 10d. ⁴	16s.	2s. 6d.	1s. 3d.	Doubled.	Doubled.	10s. to 18s.	3s. to 5s.	4s. to 5s.	3l. to 5l.
LINCOLN	16	10d. to 15l. and board.	18s. 10 19s.	2s. 6d.	1s.	5l. with board. ⁹	15s.	10s.	3s. 6d.	3s. 6d. to 5s.	5l. 5s. and wood of land.
LANCASHIRE ..	17	16s. 6d. to 18s.	18s. to 21s.	16s. 6d. to 18s.	9s.	18s. ⁹	12s.	6s. 11s.	6s. 11s.	.....	1s. to 12 3d.
CHESHIRE...	18	14s.	.....	12s.	.....	18s. to 20s.	.....	15s. to 20s.	3s.	3s. 6d.	4l.
NOTTS	19	15s. to 16s.	.....	15s. to 18s.	1s. 2d. to 1s. 4d.	20s.	12 6d.	10s. to 14s.	3s. 6d. to 4s.	4s. 6d. to 5s.	5l. to 10l.
WARWICK ..	20	5l. to 20l., with rations.	15s. to 20s.	15s. †	1s.	5 weeks' rations.	.....	5s. to 12s.	2s. 6d. to 3s. 6d.	3s. to 4s.	2l. to 4l.
	21	13s.	12s.	11s. & 12s.	8d.	Doubled.	Doubled.	10s. to 15s.	2s. 6d.	3s.	5s. to 3l.
	22	14s.	14s.	13s. †	.....	18s. to 22s.	.....	10s. to 16s.	3s. to 3s. 6d.	.....	9s. to 5l.
HEREFORD ..	23	10s. 11	11s. 11s.	10s.	6d. per 8 hours.	2s. 6d. to 3s. 6d.	12 11s.	Cut by machine.	Cut by machine.	Cut by machine.	9s. to 5l.
HUNTINGDON ..	24	14s.	14s.	12s.	9d.	25s.	9s.	8s. 6d. to 2s. 6d. to 3s.	3s. 6d. to 4s. 6d.	3s. 6d. to 4s. 6d.	9s. to 4l. 10s.
BEDFORD ..	25	14s. 14s.	14s. 11s.	2s. †	.....	4l. 16s.	.....	10s. to 14s.	2s. 6d. to 3s. 6d. 11s.	2s. 6d. to 3s. 6d.	2l. to 3l.
OXFORD ..	26	12s. to 14s. 11s.	12s. to 15s. 11s.	12s. to 14s.	4s. 6d. to 5s. 6d.	.....⁹	.....	9s. to 16s.	2s. 6d. to 3s. 6d.	3s. 6d. to 4s. 6d.	2l. 10s. to 4l. 10s.
	26½	14s. to 15s.	16s. to 17s.	11s., and piecework.	8d. to 1s.	3s. 4d.	12 6d.	10s.	3s.	4s.	12 6d.
	27	13s.	13s. 7	11s.	1s.	18s.	.....	11s. to 15s.	3s.	3s. 6d.	1s.
WORCESTER ..	28	13s. to 14s.	14s.	11s. †	4s. 6d.	15s. to 18s.	6s.	10s. to 15s.	3s. to 3s. 6d.	3s. to 3s. 6d.	4l.
	29	12s. to 15s.	.....	12s. to 14s.	5s. to 6s.	Doubled.	Doubled.	10s. to 15s.	Machine cut.	2s. 6d. to 3s. 6d.	1s. to 12 6d.
GLOUCESTER ..	30	16s. 11s.	18s. 11s.	10s. and beer.	8s. to 10s.	.....	.....	10s. to 12s.	2s. 6d. to 3s. 6d.	3s. 6d. to 4s.	2l. 10s. to 3l.
	31	13s. 11s.	12s.	12s.	5s.	15s.	6s. 6d.	7s. to 12s.	3s. 6d.	4s.	1s. to 2s.

	32	13s. to 14s.	14s. to 18s.	11s.	8d.	12s. to 14s.*	10d. to 1s.	10s. to 14s.	2s. 6d. to 3s. 6d.	2s. 6d. to 3s.	1s.
	33	10s. to 12s.	12s. 20	10s. to 11s.	10d.	.....	.....	5s. 11s.	3s. 6d. to 4s.	2s. to 4s.	
BUCKS	...	12s.	12s.	10s. to 11s.	8d. to 10d.	16s. and beer.	1s.	?	4s.	3s.	
BERKS	...	12s. 20	12s. 20	11s. to 12s.	9d.	16s. to 18s.*	1s. to 1s. 2d.	11s. to 12s.	4s. to 4s. 6d.	2s. to 3s.	
	36	10s. to 17s.	12s. to 17s.	11s.	8d. & 10d.	12s.	10d. to 1s. and beer.	10s. to 11s.	3s. 6d. to 4s. 6d.	1s. to 2s.	
	37	14s. 20	14s. and 40s.	13s.	10d.	3s.*	1s.	10s. to 16s.	4s. 6d. to 5s.	4s.	
NORFOLK	...	14s. 6d. 20	.....	2s. to 2s. 3d.	9d. to 1s.	6s. 10s.*	.....	8s. to 14s.	2s. 6d. to 3s. 6d.	3s. 10s.	
SUFFOLK	...	13s.	16s. to 20s.	12s.	4s.	7s.*	.....	?	2s. 9d. to 3s. 6d.	3s. to 4s.	
	40	12s.	13s. to 15s.	.....	.....	Double pay.	Double pay.	.....	.....	2s. 10s. to 4s. 10s.	
	41	4s.	55s.	37s. 8s. 10d.	.....	7s. 2s. 6d.*	.....	8s. to 14s.	3s. to 4s. 6d.	2s. 10s.	
ESSEX	...	14s. 20	14s. 20	15s.	8s.	7s.	.....	10s. to 15s.	5s. to 6s.	2s. to 3s.	
	43	14s. 6d.	15s. 20	13s.	9d.	7s. 4s. per month.	24s.	10s.	4s.	4s. 8d.	
	44	11s.	12s. to 13s. 20	10s. to 11s. 1	.....	4s. to 5s.	.....	7s. 6d. to 12s.	2s. 9d. to 3s. 6d.	55s. to 70s.	
	45	16s.	16s.	2s. 2d. 1	1s.	5s. to 6s.	2s. 6d.	10s. to 20s.	2s. 6d. to 5s.	2s. to 3s.	
MIDDLESEX	...	15s.	16s.	13s. to 18s.	6s.	Paid over-hours.*	Paid over-hours.	14s. to 20s.	5s. to 7s. 6d.	6s. to 8s.	
SURREY	...	15s.	15s. to 17s.	13s.	6s.	3s. and overtime.*	.....	10s. to 12s.	3s. to 4s.	4s. to 5s.	
	47	13s. 27	14s. 20	2s. 6d. to 3s.	1s. to 1s. 4d.	3s. 6d. to 4s.	1s. 6d. to 2s.	10s. to 15s.	4s. to 5s.	6s. to 7s.	
WILTSH	...	12s. & many perquisites.	About the same.	10s. 1	8d.	12s. to 20s.	.....	10s. to 12s.	2s. 6d. to 3s.	Rent free.	
	50	12s. 20	36s. to 39s.	10s. to 11s.	8d. to 1s.	2s. 6d. and drink.	1s.	9s. to 12s.	2s. 6d. to 3s.	30s. to 50s.	
	51	11s. 20	11s. and 5s.	10s. 1	4s.	2s.	1s.	10s. to 14s.	2s. 3d. to 3s. to 4s.	2s. 10s. to 3s. 3s.	
KENT	...	16s. 20	15s. & extra for lambing.	15s.	.....	Double.	Double.	12s. to 18s.	4s. 6d. to 4s. to 4s. 6d.	Free to ploughmen	

COUNTIES.	No.	A	B	C	D	E	F	G	H	I	K
SUSSEX ...	53	14s. 6d. to 16s. 1d.	15s. to 18s. & gratitudes, 15s. and house, 15s.	13s.	.....	2s. 6d. to 3s. 6d. ^a	1s. 6d.	11s. to 15s.	3s. 3d.	3s. 9d. to 4s. 6d.	1s. 6d.
WEST SUSSEX ...	54	14s. to 15s.	15s. and house, 15s.	13s. to 14s.	.....	21s. ^a	.....	12s. to 15s.	3s. 6d.	4s. 6d. to 5s.	2s.
	55	15s. ^a	15s.	2s.	8d.	3s. 6d. and 3 quarts.	.....	10s. to 15s.	3s. 6d. to 4s. and 3 quarts.	3s. 6d. and 3 quarts.	11s. to 21s. 6d.
HANTS ...	56	12s.	14s.	12s.	5s.	Man and wife, 36s. ^a	Man and wife, 36s. ^a	10s. to 12s.	3s.	3s. 6d. to 4s.	2s.
NORTH HANTS ...	57	12s. and 2d. to 3d.	12s. and 2d. to 6d.	12s.	9d.	3s.	.....	10s. to 12s.	3s. 6d. to 4s.	4s. to 5s.	2d. 10s. to 3d. 10s.
DORSET ...	58	9s. ^a	9s.	8s. ^a	4s. 6d.	12s.	6s.	15s. per week.	15s. per week.	15s. per week.	Cottages are free.
DEVON ...	59	12s. 3 pints of cider.	15s. & many perquisites, 12s. to 14s.	12s. ^a	.....	3s. 6d.	.....	Cut by machine.	Cut by machine.	Cut by machine.	12s. to 12s. 6d.
	60	10s. ^a	12s. to 14s.	2s. & 12s. 8d.	8d. to 10d.	3s. 4d. with beer.	10d. to 11s. 2d. and board.	6s. to 8s. & 1 gallon.	2s. 3d. to 2s. 6d.	3s. 3d. to 3s. 6d.	2d. 12s. to 3d. 5s.
CORNWALL ...	61	12s.	12s. and 3d. per year.	10s. to 12s., and Wheat at 7s.	9d.	Meat and drink.	Meat and drink.	8s. to 10s.	2s. 6d.	3s. 6d.	3s. 10s.
CAERMARTHEN	62	12s. to 15s.	.....	12s. to 13s.	1s.	As at other times.	As at other times.	.....	3s.	3s. 6d.	3s. to 4d.

The following Notes are supplementary to the information given in the several instances quoted in the foregoing pages. They are referred to by means of the index figures which here distinguish them.

¹ With 64 bolls (of 140 lb.) oatmeal, and 1 ton potatoes; 3 to 4 imperial pints milk a day; cottage and garden free. Unmarried men, money and meal same. Coals and house provided.

² Head shepherds have house and garden, cow keep, and 64 bolls meal; young shepherds get their bed and board in the house. ³ Head married ploughmen, 64 bolls meal, 4 bolls potatoes, 1 gallon sweet milk daily, free house and garden; coals carted. Single ploughmen lodge and get their food in the house.

⁴ With 5 to 6 loads oatmeal; free house and garden; coals carted free, &c. Equal to an annual wage of about £56.

⁵ The same as ploughmen, with, sometimes, cow keep.

⁶ 120 to 130 imperial stones of oatmeal, 4 tons of coals, 2 to 3 bushels of potatoes planted on master's manure; all the manure they make planted with potatoes; house and garden; per annum. Shepherds about the same.

⁷ House rent free, and 400 yards of potatoes, and coals carted.

- 7 From 4 to 12 bushels of wheat, a few bushels of barley, 60 to 100 stones of potatoes, and free house. I pay my own men 16s. per week, 6 bushels of wheat, 4 bushels of barley, 80 stones of potatoes, land to plant 10 stones of potatoes (about one-tenth of an acre), with free house, garden, and coal as free.
- 8 Perquisites as ploughman, and six ewes and four hogs kept.
- 9 Cottage and garden rent free, a ton of coals, and 18 gallons of ale in the lambing season, and 6s extra wages in harvest, besides other small perquisites.
- 10 Beer in harvest, or 6s instead. Keeps a pig; if not, is allowed 1s to 20 stones of pork. Has beer or money for delivering corn, hay-carting, &c. Pays for house and garden. Under horse-keepers and ploughboys, 1s. to 14s. per week. Beer or money.
- 11 Cottage and garden free; corn to let 2s. 6d. per week. From 23 to 23 10s. extra pay for harvest, or its equivalent in fresh pork; 9 to 12 bushels of potatoes, or pint.
- 12 With beer, 6d. per week in cider, five-roomed cottage, with large garden, rent free, and allotment of potato ground in the field, and coals hauled.
- 13 With beer, 6d. per week in cider, and other perquisites as ploughman.
- 14 With cider and food on working days.
- 15 Paid for overtime after six at night. He has the same in harvest as other men, with an allowance for Sundays. He has also "journey" money, besides beer for drilling.
- 16 With, in some instances, house and garden free. An allowance is made for each lamb, generally 2s. 6d. per score. The shearing is done by the shepherds at 1s. per score, besides day's pay. He also receives the same in harvest as other men, with an allowance for Sundays.
- 17 Ale is given for threshing, drilling, shearing, and other operations too numerous to mention. In hay time the men get from four to five pints per day; in harvest from four to seven pints. The beer costs the farmer for each man per week from 1s. 6d. to 2s., taking the year through.
- 18 Extra 6s for the lambing season, 6s for shearing sheep, 6s for hay and harvest.
- 19 Including house-rent, beer, and sundry perquisites.
- 20 With house (6s) 6s for lambing, 1s. 6d. per score for shearing, and 6d. a day beer-money in harvest.
- 21 6s for lambing 6d. for every double couple, 2s. 6d. per score for clipping sheep, 6d. per score for all sheep taken to market and cottage.
- 22 Stable beer, 6s at Michaelmas, 1s. for every load of corn drawn out, and house rent.
- 23 House rent, 6s at Michaelmas, and 1s. a head for every double couple bred up.
- 24 Harvest-money and cottage rent free.
- 25 With cottage, and 6s for the harvest month.
- 26 4s. a week for beer during six weeks' lambing time; 6s per 100 lambs. No harvest wages.
- 27 6s. with one or two pints of ale per day, in lambing season. 1s. per head for all lambs reared more than number of ewes set, and paid by the score for shearing.
- 28 With free cottage and garden, valued at 2s. to 3s. per week. Wet time paid for; and in case of a month's sickness no deduction made.
- 29 Extras: 6s for harvest, 1s. per load for delivering the corn to the miller, &c., and cartage of fagots and manure; making a total of 6s 3d to 6s 9d.
- 30 With 6s for harvest, house and garden rent free, and 1s. or 1s. 6d. when out with corn. Under men, 6s. to 9s. per week and 6s at Michaelmas.
- 31 Our ploughmen are mostly single men, hired by the year; wages, 6s 12 to 6s 14, with board and lodgings.
- 32 And 6s to 6s 10s. in harvest.
- 33 Good cottage and garden free.
- 34 There is some peculiarity in the amount of wages paid in this locality: the regular labourers on the farm have their cottages and gardens free, and wheat (either in proportion to their families or the number of workers) at 5s. per bushel. The shepherds and carters have, in addition, potato land, also free. Changes are seldom made—men working for one master or on one farm all their lives. Cottage accommodation indifferent, education not first-rate.
- 35 Cottage free, or the same wages with firewood found; coals drawn home, potatoes ditto, manure drawn, and other assistance given in cultivation of their allotment ground. Single men, who board and lodge in farmhouse, have in money wages 6s 12 to 6s 10 or 6s 12 a year.
- 36 With beer or cider daily throughout the year.
- 37 With beer or cider in harvest time only.

In Dorsetshire, Mr. Saunders, of Watercomb Farm, Dorchester, writes to me as follows:—

“In answer to your inquiry respecting the wages of the labourers of this part, I will give you an account of what I pay my agricultural labourers of different callings. They all live on the farm near their work, where it is convenient for most of them to go in to dinner every day. I have eighteen cottages, for which I never receive any rent, as my men all live rent free, and most of them have good gardens, besides other potato land free. It is a very great accommodation to labourers to reside near their work; it is quite worth 1s. per week to a man not to have to travel a mile to his work morning and evening: and all have their regular pay, wet or dry weather; there is no loss of time except they are working by piece work, which most of them get in their turn during the year, when they generally earn from 10s. to 15s. per week, according to circumstances. And all this is in addition to their yearly privileges, which, as many of my labourers have said to me at different times, ‘is nearly half our living,’ referring to a cottage garden, potato land, and the privilege of having grist over that of buying bread of a baker, as I regulate the grist by allowing a peck a head to the family of workers in a house. I think our system is nearly equal to other counties, where they give nearly double the wages, but no house nor other privileges, nor pay for wet days. In this county we agree for a family at a certain sum, from the 6th of April to the 6th of April in the following year; and some of my men have continued on my farm with me for more than thirty years without change. The following is about the general run of wages in our county:—

	£	s.	d.
House, good garden, worth to let, £4 a year	4	0	0
Weekly wages 8s. or 9s., and 30 perch of potato land ploughed in with their potatoes, often growing 15 sacks, now worth 10s. per sack, which, allowing the seed out, would be worth £5	25	16	0
200 furze faggots, carried home free to the cottage	1	0	0
28 cwt. best coals, carried home at 1s. per cwt.—advantage worth at least	1	14	0
Extra for harvesting, cash £1, and 1 gallon of ale per day	2	0	0
Every journey with team, 1s.; average one per week	2	12	0
Three quarts of ale per day at haymaking, for 8 weeks, at 9d. per gallon	1	7	0
One bushel of wheat per week (more, if there be other workers in the family) at 5s., not much advantage now, say 6d. per week, but when dear, 3s.	1	5	0

The ploughman's (carter's) wages are thus about 15s. per week ... £39 14 0

My shepherd has the same as the horse-man, except that he earns	£	s.	d.
about £3 extra for sheep which he shears, and he has 1s. per			
score for all lambs bred, which at about 600, is £1. 10s. ; and			
also 6d. for every ram let or sold, generally £2 10s. in all	...	7	0 0
Take from this the difference of carter's journey money, which is...		2	12 0
Leaving in favour of shepherd	...	4	8 0
Wages and perquisites as carter's account	...	39	14 0
Shepherd's wages weekly, 17s.	...	£44	2 0

"The common *labourer* receives 8s. per week, house, garden, potato land, 200 of furze, 15 cwt. of coals, grist, as I have before stated, at one peck per week for every one who works, great and small, some at 5s. per bushel, and some at 6s. per bushel ; and most of my labourers have piece work at different times of the year when convenient. I consider, on an average, a good labourer's place with me is worth fully 12s. to 13s. per week."

This is a most elaborate scheme of payment, and certainly a very liberal one, though I do not value the items so high as Mr. Saunders does, making the yearly wage of his ploughmen as nearly as possible 14s. a week. I may add here, in illustration of the Dorsetshire method of paying wages, that at a meeting some time ago of the Blandford Farmers' Club, it was resolved that the wages of ordinary agricultural labourers then paid in the county amounted, taking perquisites into account, to at least 12s. a week, while for shepherds, carters, &c., 14s. or 15s. a week was a common payment.

2. Now, over large districts in England another system obtains, of which Mr. Manser, a tenant farmer at Dumpton, near Ramsgate, gives the following very interesting account :—

"Our ploughmen here are generally single and yearly servants, and are boarded and lodged by the farmer or by his bailiff. They are hired from the 11th of October to the 11th of October each year, and though they sometimes continue for several years with the same master, a fresh agreement takes place every year. They commence as lads at thirteen or fourteen years of age ; their duties then are to drive the horses and attend to them in the stables, and we almost invariably find that the younger the boys go to service (as it is here termed) the better ploughmen and the better labourers they afterwards become. They begin at about £5 wages per annum, which is usually increased every year as their strength and ability increase, or as master and servant agree ; the increase goes on at the rate of about £1 per year,

and our head horse-man or waggoner, gets from £12 to £14 per year. The cost of their board varies according to the price of provisions, and when they are boarded by a third party, it is generally paid partly in money and partly in kind; they always have meat three times a day, and cannot be boarded on an average at less than 8s. per week per head. In some few instances, however, where there are cottages near, married men are employed as ploughmen at wages of 14s. per week, and a cottage rent free; if they have to pay rent they are usually allowed about £5 extra for harvest, in addition to the 14s. per week. I find, on examining my labour account, that my best men, on an average of the year through, earn about 16s. per week, or a little over £40 a year. This includes harvest and hay-making, as well as lost time from weather or other causes, and is the man's earnings, independent of the rest of the family." He adds, "Our labourers pay about 2s. 6d. per week rent for their cottages, and for this many get but a miserable home. I know of nothing in the neighbourhood so disgraceful as the want of accommodation for labourers. They are (many of them) driven to reside in the worst parts of the towns, many of them in hovels, built or rather stuck up for the sole purpose of investment, without any regard to health, comfort, cleanliness, or morality. No garden is attached, or anything else to make a poor man's home comfortable; they are completely away from the eye of all who feel an interest in his welfare. The consequence I need not describe. There is every inducement for them to spend their spare time and hard earnings at the public-house or beer-shop; they have often from two to three miles to go in all weathers to their labour; they never know the luxury of a hot dinner or a meal with their families, except on a Sunday; the children run the streets in the worst parts of the town, and get early imbued in every wickedness. With no father near to correct them, how can it be otherwise? I do hope this subject will be pressed before the public on every favourable opportunity."

There are several local or provincial peculiarities in the relation of farmer and labourer which, though not exactly of the same class as that to which Mr. Manser's letter alludes, may be mentioned in the same paragraph with it, for in both there is part payment of wages in the form of board and lodging. I refer to the so-called "bondager" and "bothy" systems prevalent in the south-eastern and in the north-eastern counties of *Scotland*.

In the former, the married hind who occupies one of the farm cottages, is bound to provide for his master during the year, a woman worker, who thus becomes the "bondager," receiving 10d. to 1s. as may be agreed upon for every ordinary day's work she does, and 1s. 6d. more for every harvest day's work she does. This is a great burden on the man, for it imposes a lodger on him who may be a most undesirable inmate; and such women workers are able to obtain from £7 to £9 as yearly wages, along with their board and lodging, the expense of which, borne by him, is rarely met by the daily wages which the woman earns for him. And the system is not good so far as she is concerned either, for it places her in the position of a servant's servant, and removes her so far from direct relationship to the master of both, as to impair that interest in her well-being which he might otherwise both feel and exercise.

In the "bothy" system, on the other hand, the young men whom it concerns are directly the servants of the farmer—they are his unmarried ploughmen and labourers—and he provides a room or rooms (the so called bothy) in which they are lodged apart from the farmer's house, and in which they have their meals, which are in fact oftentimes prepared by themselves. Of course such an establishment may be so looked after by the master, as that it shall be a useful school to all its inmates—but this represents only the possibilities of the case—the probabilities of it, as of every other enforced departure from, or violation of, the family system natural to man, are far otherwise. The evils of the system arise out of the isolation of young men, the impossibility of any but clandestine association with the other sex, and the consequent liability of such intercourse to become licentious. And it is a fact which might have been expected under the circumstances, that there is a greater number of illegitimate births in proportion to the population where the system prevails than occurs elsewhere. The wages obtained by young men in the districts of the bothy system are stated in the table. The system itself has no doubt arisen out of the absence of sufficient cottage accommodation for the labourers of the district. The responsibility for the evils which have arisen out of it rests primarily, therefore, on the landowners of the locality.

In Lincolnshire and some other counties, Kent, for example, as Mr. Manser mentions just above, a system of boarding young labourers prevails; and on this subject a paper was read, some years ago, before the London Farmers' Club, by Mr.

Marshall, of Riseholme, Lincolnshire, whose experience was thus described :—

“In some of the southern and midland counties the custom prevails of hiring labourers by the year at a certain sum per week, which is regularly paid every Saturday night, a small deduction, say about 2s., being kept in hand to ensure the service till the end of the contract, the servant in all cases engaging to board and lodge himself at his own expense. This he usually does with the foreman on the farm, who undertakes to supply him with bread, meat, milk, and vegetables, at a fair market price. In addition to the cost of provision, 1s. 6d. per week is charged for lodging and cooking ; no beer whatever is allowed, except during the time of hay and harvest, when four pints per day are commonly given. The greater portion of the servant's wages is thus absorbed (some being in debt) or spent in some less creditable manner, and the only accumulation he can boast of at the end of the year is that of the 2s. per week retained in his master's hands, which he will require for the purchase of clothes, shoes, &c., leaving little or nothing as a fund for the savings' bank. In some of the northern counties, and also in North Lincolnshire, with which I am more immediately connected, it is the custom to employ a large number of unmarried servant men and lads, who are regularly hired by the year, from Old May day till Old May day, at the various statutes held in the district for that purpose. At present wages vary from £5 for lads who can plough and go with horses, to £20 for head wagoners, who are also drill men, and stack during harvest. On a farm of 500 acres of turnip land it is customary here to work about fourteen horses, for which five farm servants, under the superintendence and control of a married foreman, are considered sufficient. The foreman, with whom these men reside, is, of course, a responsible person, and undertakes to provide them with everything that is requisite as far as board and lodging is concerned. He also sees that they do their duty during the week, and that they invariably go to church with him on a Sunday once at least. An ample house, and garden for vegetables, is provided rent free ; £30 a year is in wages given to the foreman, who has also the produce of two cows for five, or one cow for three men ; twenty-six stones of bacon (*i. e.* a fat pig weighing twenty-six stones) for himself, and twenty-six stones for each of his men ; he has, further, forty stones of flour, twenty of best seconds for puddings and pies, and twenty best thirds for bread for each man, one

quarter of malt for himself and the harvest men, and one sack for each man servant (equivalent to one pint per day and four in harvest). He has five tons of coal for the year's consumption; he finds candles for the stables and chaff-house, when required; and has 1s. per day for all casual boarders, such as additional harvest men, blacksmiths, carpenters, &c., who work by the day, and have their board. The men have three meals per day. For breakfast hot bread and milk, and cold meat; for dinner hot meat, pies and puddings, vegetables, and one pint of ale; for supper hot meat, bread and milk, or pea soup. By this means they have always meat three times a day, milk twice, and beer once. They pay for their own washing, and are allowed an interlude of three or four days as a holiday at some fitting period during the year, which always expires on the 13th of May. I believe the quantity of bacon allowed is always consumed, but I believe the flour is a little above what is required. The ordinary consumption of a man, his wife, a servant maid, and five men, usually averages about thirty stones for each person per annum. The annual expenses of their board and wages may be set down as follows:—

	£	s.	d.
Foreman's wages	30	0	0
26 stones of bacon, at 7s.	9	2	0
1 quarter of malt	3	12	0
2 cows, at 3s. 6d. each per week	18	4	0
130 stones of bacon, for five men, at 7s.	45	10	0
200 stones of flour, at 2s.	20	0	0
5 sacks of malt, at 9s.	9	0	0
5 tons of coals, at 12s.	3	0	0
Wages:—2 wagoners, at £12	24	0	0
„ 2 middle men, at £10	20	0	0
„ 1 boy at £6	6	0	0
	<hr/>		
	£188	8	0

In addition to the above, the foreman's wife shares largely in the profits of this system, inasmuch as she has the butter and superfluous milk from two cows to dispose of, the privilege of raising poultry of every description, and gathering eggs. For these she receives a certain price per couple and per score, out of which she pays her maid servant, and retains the residue as her own perquisite in return for her vigilance and labour. Upon her good management very much depends the comfort and well-being of the whole establishment. These items amount to £188 8s. for six men, namely, one foreman and five farm servants, the yearly

average for each being £31 8s., or within a very trifling sum of 12s. per week. Now, if it be taken into consideration that the ordinary wages of a daily labourer in that district are 15s. per week, exclusive of a very considerable increase during harvest, I think it must in justice be conceded to me that I have, at least, pointed out to you not only a far cheaper, but in every other respect a far better plan; such a one, moreover, as may at any time be made available in any county or in any locality, and one that is equally advantageous to master and servant. It has, too, the acknowledged authority of one of the largest and best cultivated districts in England to confirm its practical utility, and to warrant its more general adoption."

Mr. Marshall's interesting account furnishes a very liberal and excellent plan of managing his men.

3. The third method of payment is by a weekly sum of money. The amounts given in the several districts of the country have been already stated: and the only remark to be made upon the system is that, whether the payment be weekly or fortnightly, it will be a great convenience to the recipients if they are paid on Thursday or Friday evening instead of Saturday. The marketing for their families can then be done with greater advantage to themselves; and there is, perhaps, less temptation to spend money at the beer-shop. As regards weekly labourers, also, care should be taken to pay wages justly; *i. e.*, according to the real worth of the men. Nothing more discourages effort, self-respect, and energy in men, than treating them alike, however different may be their value as labourers. Under this head, the alternative has to be considered of payment by the piece, and payment by the day or week. It seems plain that the former is the better plan whenever it can be adopted. A little experience will enable any one to determine the proper price per perch, or acre, hundred, ton, or bushel for the operation. The price should be fixed before the work is commenced, and whatever may be the wages earned per week under this agreement they should never be begrudged. On the other hand, if the wages earned be insufficient, it is better to make it up by letting the next job more liberally, rather than by a sum paid as a recompence for the loss, for this would tend to give the labourer hopes of wages to be earned otherwise than by industry. In either case the work should be carefully superintended throughout its performance, as it will demoralise the labourer as well as injure the master if a *careless and imperfect* performance be allowed. The prices to

be paid for various kinds of work will be found on reference to the index.

21. Piece-work Payments.—This subject requires, however, a more detailed consideration ; and this it received in so able and satisfactory a manner by Mr. C. Howard, of Biddenham, near Bedford, at a meeting of the Central Farmers' Club, that I shall use his words on the subject.

"A farmer," he says, "is far from being so advantageously placed as the manufacturer in letting his work by the piece, inasmuch as it is impossible for all the work of the farm to be performed on that system ; a great deal, such as the feeding and tending of stock, carrying corn to market, and many of the field operations, cannot be done otherwise than by the day. Again, the farmer has to contend with the elements ; and, if ever so disposed to keep his men at piece-work, the weather frequently prevents him. Again, some farmers are situated, as I am myself, with a good and well-conducted set of men, whom he is disposed to keep all the year through ; and at certain seasons, when work is not very plentiful, there is no inducement to the farmer to set his men to piece-work, which would have the effect of raising his weekly expenditure. Still I think the system might be advantageously extended ; for I find upon farms where piece-work is generally adopted, the work of a farm is always in a more forward state than where the day system prevails ; the men are better off, they are more active, and more skilful. It is a well-known fact in the commercial and manufacturing world that those trades have been the most successful, and have made the greatest progress, in which piece-work has been the rule ; and I think this may be partly accounted for on the ground that the men feel an interest in facilitating the various operations upon which they are employed ; the energies of their minds are also bent upon finding out easier and quicker methods of getting over their work. Put a set of men by the piece ; at once a rivalry is felt as to who shall do the most work, or, to use their own words, be "best man." Piece-work, too, is the readiest way of making a difference between the good and indifferent labourer ; and the plan adopted by many masters who wish it to be the rule, is to pay a comparatively low price by the day, in order to induce their men the more readily to take piece-work."

Mr. Howard proceeded to give the reports on the subject which he had received from correspondents in different parts of the country. In the northern part of England and in Scotland,

there is not much work done by the piece, in consequence of the practice of having yearly or half-yearly servants. In most of the counties of England, on the other hand, it is carried out to a considerable extent; the operations by the piece being hoeing of corn and root crops; filling and spreading manure; mowing grass and seeds; washing and shearing sheep; cutting, carting, stacking, and thatching of corn; laying and trimming hedges, ditching, draining; mangel pulling; turnip cleaning, heaping, and covering; cutting haulm, and threshing Lent corn. I have made particular inquiries as to the important subject of harvesting, in which great changes have been effected since the introduction of reaping machines. Mr. Howard's own practice is to let the whole of the cutting, carting, and thatching to a company of men for so much an acre. This plan is also adopted by his neighbour, Mr. Pike, of Stevington, who says:—

“I let my last harvest as follows: I agreed with seventeen of my own men to cut, cart, and stack the whole of my corn at 11s. per acre, with four pints of beer per day, to be cut close to the ground and all tied, viz., one hundred acres of wheat, sixty of barley, fourteen of oats, and sixty of beans. I agreed to find boys for carting and to horse-rake it; they tie and cart the draggings; the thatching is done at 1s. per acre. In former years I let the thatching by the square; that did not answer, as they made too many stacks, by not carrying them high enough in the walls. With regard to using the reaping-machine, they agreed to allow me 3s. per acre for the use of it and horses. By adopting the plan of letting the whole harvest, I had very little trouble with men or boys, for I find if they do not get on fast enough, they can get hands when I could not.”

Reference will be made in the sequel to the cost of different agricultural operations, both when done by day-labourers and when paid for by the piece. The above statement has, in the meantime, been extracted from Mr. Howard's lecture, in illustration of the general superiority of the latter plan of payment whenever it can be adopted.

22. Relation of Master and Servant.—For all the various customs of payment there must, however, of course, be the general assent of the labourer, and the concurrence of both master and servant; and so long as a labourer agrees to take certain wages, there is no place for interference by any other person.

I will, however, say that a very short acquaintance with the

subject shows that every system which has been devised for paying labourers is liable to abuse. The payment of a stipulated sum of money for stipulated services to be rendered is, of any plan, the least so liable, and it ought as far as possible to be carried out. That system which gives food and accommodation is the best of all, when administered with kindness; for the extras are worth to the labourer much more than the sum at which they would be valued to him in a money payment; but it is more liable to abuse than the simple money payment. The abuse in this case affects the due reward of labour; as, for instance, the privilege of receiving wheat at 5s. a bushel may very easily be made no privilege at all. The payment, too, of all this household stuff as wages, is a thing which affects householders only, and the young men who are leaving us are those whom we want to keep. To do so, then, as Mr. Mein, a large employer of agricultural labour, tells us, we must just offer wages which will keep them—wages, too, according to the work they do. This, however, is not the whole truth of the matter. The relation of master and servant is mixed up in agriculture with much beside a mere bargain for the sale of services—with much that is personal; there is more scope for the development of kindly personal feeling between the two than there is in the case of any other class excepting household servants. Of course this personal feeling may show itself in that which is of higher value than money is capable of measuring. A young man will, notwithstanding lower wages, keep his place for the sake of advantages of greater value than the increased sum he might otherwise receive. His master takes an interest in him personally, showing it by helping forward his education, and by seeking ultimately a better position for him; and this is soon observed and thought of. But there is a reverse side to this picture, and just in proportion to the closeness of contact which the terms of service enforce between the two *may be* their recoil asunder as soon as they are once more free.

If there be a plan which would strengthen the bond between the two more than any other, one would imagine it to be the very common one in England of lodging the younger labourers in the farm-house, and giving them partial board as well as cash. But what is the ordinary experience on this point? In many an English country parish, Old Michaelmas Day sees an almost complete sweep of the young men and lads who have lived during the past year in the houses of their masters. The evening school

each winter presents a new array of faces—and the masters are for a while at least and necessarily as much strangers to their lads and many of their men, as if they paid their wages through a clerk, and had as little opportunity of personal acquaintance as a manufacturer with his hundreds of mechanics.

It is plain that it is not in the *system*, but in the administration of it, that merit and demerit lies, and that while sufficient wages (and that is just as much as labourers can get) are given, a personal interest in the labourer as a neighbour is what will bind him to his master.

If I had in a single sentence to describe the relation of master and servant in the agricultural world, it would be to assert that nowhere is it better and nowhere is it worse. The two are thrown closely together, and character is on both sides known, and therein lies the explanation; the two are never, as is unavoidably the case when one man pays 500—they are never indifferent to one another—they love, honour, and respect each other, or they distrust and hate: and while in the former case there is a noble scope for exerting a useful influence for their well-being over those who are employed, the latter, in the very closeness which is the condition of agricultural service, has scope enough for bringing forth its fruit.

The combination of sufficient wages with a greater scope for personal goodwill than any other trade affords, is what may, and often does, honourably distinguish agricultural labourers and employers amongst the multitude of English occupations.

Let me add one word more on this topic. The whole value of the expression to which this goodwill leads arises out of its origin in a personal feeling—it cannot be deputed without altogether losing its character. Anything like the transference of my personal duty and pleasure in such a thing to a public institution spoils the whole affair.

There are local and provincial societies long established in England for distinguishing the worthy among agricultural labourers by public testimony to their worth. If that worth had shown itself in public-spirited conduct, nothing could be more appropriate than a public acknowledgment of it. When it is, however, only personal and domestic worth (far more worthy, let us all admit it, than the other), nothing can be more grotesquely out of place.

These societies have, however, been established, and are supported by a real if unwise philanthropy, and I would not say one

word in discouragement of their object, however unwise may be their plan. Benevolent men have truly seen that the relationship of master and servant is but a part of the truth affecting them; and in carrying the superiority of the employer over his servant into a field where no superiority exists, they have read the commandment as if it were addressed to the former only; and as if it said of the latter: "Thou shalt be a father unto him." The system of rewards for good conduct, for long servitude, and for morality, is founded on a mistaken idea of this kind. It is a mistaken idea—let me repeat it. Along with the paternal relationship, with all its powers and responsibilities, wherever it really exists, God has implanted the natural love of the father as the safeguard of the child, and the docility and helplessness of the child as the counterpart justification of the father. Neither of these conditions applies to the relationship of master and servant. The commandment has been mis-read. It is really addressed to both alike, and it prescribes a perfectly mutual and equal duty in words addressed to each—"Thou shalt love thy neighbour as thyself."

This is the law which supplements the bare relationship of master and servant, and makes the operation of it perfect. But it is not for me to pursue the subject further, or to illustrate at any greater length to what it leads. I will only add that the more we encourage genuine individual manliness in labourers, with its efforts after real self-improvement in intelligence and skill, and its higher sense of individual responsibility, the more likely are we to attach the young men to us, and to obtain labour of the kind of which steam-power is rapidly proving the necessity. But this is not to be done either by taking all the difficulties of their position out of their way, or by offering rewards to them proper only to the qualities and condition of a child.

23. The condition of the Agricultural Labourer has of late occupied a good deal of public attention. The Rev. Canon Girdlestone, incumbent of the Parish of Halberton, in Devonshire, has attracted it, by his efforts to raise the condition of farm labourers in his neighbourhood, and in particular by the very considerable number of labourers with their families whom he has sent from that district of comparatively low wages, to other parts of the country where wages are higher.

The attention drawn to his proceedings resulted lately in a public meeting held in Willis's Rooms, St. James's Square; at which it was resolved, almost unanimously, (1) that in many parts of

the country, the condition of the agricultural labourer, as regards wages, house accommodation, and opportunities for acquiring information and manual skill, is such as demands serious and immediate attention. This was a proposition to which all were ready to assent, but when Mr. Girdlestone proceeded to found upon it (2) a proposal to encourage and assist the formation of agricultural labourers' unions, he was supported almost exclusively by political agitators, such as Messrs. Beales and Potter; and although it was resolved that these societies should be carefully guarded against all possibility of violent aggression, either on employers or fellow-workmen, and that their chief object should be to secure fair remuneration to labour in proportion to skill, ability, and industry, it was felt by a very considerable minority of the meeting that he was endeavouring to introduce a new and mischievous agency between agricultural employers and labourers.

The Conference was attended by many who might well claim to represent both classes—the Earls of Essex and of Lichfield, Lord Northbrook, Marquis Townshend, Mr. C. S. Read, M.P., Mr. Fawcett, M.P., Sir E. Lechmere, Bart., Mr. Ed. Beales, Mr. G. Potter, Professor Rogers, besides the Rev. Canon Girdlestone and others by whom the meeting had been organised.

The upshot was, that by a narrow majority the Rev. Canon Girdlestone succeeded at such a meeting in introducing the trades' union principle among agricultural labourers. It would be a very mischievous mistake; but the seed will not, we believe, find a congenial soil in the field where it is now for the first time planted. No doubt the first of the above resolutions states nothing but the truth. It would, however, have been also true if the words it uses had been applied to any other class of labourers—for in many places the condition of the mechanic also and of the day labourer in manufacturing and commercial industry is extremely unsatisfactory. And it was the knowledge that the trades' union principle had been for so many years in operation among them without beneficial effect—if, indeed, it has not rather tended to aggravate their misfortunes—that at this meeting, guided though it was by Messrs. Beales and Potter quite as much as by Canon Girdlestone, the second resolution, inaugurating labour unions in country districts, was adopted by a majority of only five.

It would, we believe, have been more serviceable to the agricultural labourer if the many benevolent men in our country districts could have united in a society which should have been devoted simply to the work which Canon Girdlestone has been

lately doing, so that thus there might have been spread throughout the country in every village a more perfect knowledge of the agricultural labour market. One speaker did, indeed, declare that to take the labourer from where he is badly paid, and place him where he is more wanted, would tend rather to reduce wages where they are high than to raise them where they are low. But it is plain that such a result is inevitable, and that the amount of wages in any district cannot be directly altered. The equalising of the demand for labour is the only help that, in the nature of things, can be offered.

It is plain that it is only indirectly that we can aim at the results desired, and the only immediate palliative possible for excessive local hardship appears to be migration to localities where labour is dearer, being scarcer. If Canon Girdlestone had called to his aid a local agency, by which a freer intercourse and intelligence might be opened up between labourers and employers all over the country, he would have benefited both classes, and thus have certainly secured a benefit for the one which needs it most. As it is, he asks for money wherewith to pay travelling agents who will do what in them lies to set employers and farm labourers at loggerheads all over the country. A committee has been constituted to appoint organising agents, who will be employed in forming the several local unions of agricultural labourers, and in directing and superintending their working; and those interested in the improvement of the condition of the agricultural labourer are requested to provide the funds for the payment of the salaries of these organising agents, and the other necessary expenses. We are persuaded that the money spent in this way, notwithstanding that these organising agents are to be instructed "to promote in all possible ways the improvement of the agricultural labourer," will be money not merely thrown away, but productive of injury to the class it is intended to benefit.

At the same meeting, Mr. Fawcett, M.P., moved and carried a resolution :—

"That in the opinion of this Conference the condition of agricultural labourers will continue to be depressed and unsatisfactory until their education is secured by compelling children under thirteen years of age to attend school so many hours a week." This is another subject which has engaged a good deal of attention lately, and on which attempts at legislation have been and no doubt will be made. It is impossible, within the limits of a little book, intended to be simply descriptive and instructive as

to the actual condition of farm labour, to state the arguments at length on which the discussion rests. Considering the slow progress of school work in country places, and the advantages which have arisen from a corresponding rule in manufacturing towns, it seems desirable that, up to a certain age, no children should be allowed employment in the field who cannot show a certificate of a certain attendance at school; and the age of nine or ten years is one which has received the assent of many Chambers of Agriculture before whom the subject has been discussed. I may refer those who are interested in the question to a lecture (1868) by the Rev. Prebendary Brereton, before the Barnstaple Farmers' Club, on "Earning and Learning;" to a paper, by Mr. Herman Biddell, read last March before the Framlingham Farmers' Club, on "the Employment of Women and Children in Agriculture;" also to a pamphlet on "the Education of the Agricultural Poor" (Chapman and Hall), being an address on this subject, before the Botley Farmers' Club, by Captain Maxse, R.N.

The Rev. Prebendary Brereton says that it is a mistake to call any class who maintain themselves "the poor." The poor are those of all classes who are struggling, unable to maintain themselves in their class. And it is the children of the agricultural labourer of whom Captain Maxse speaks in his pamphlet as the poor. Nevertheless, his opening sentences do, to some extent, justify its title; for he speaks almost immediately of the evidence which exists at every board meeting at the Union of the semi-pauperised condition in which too many of the class exist, so that "the steady mustering at the Union, after one fortnight's hard weather, is sufficient to illustrate the semi-pauperised, thriftless, and indigent condition in which they exist." The perusal of the three addresses I have named will put the reader in possession of almost all the facts and arguments necessary to guide his opinion on this subject. I think that the tone of Mr. Biddell's address is the one which will be most likely to commend itself to experienced men. He said:—"Farmers as a body do not always do the best by the little boys they have about them. The extension of the Factory Act will not make them a bit better in that respect, but a little thought and a good deal of attention might improve matters vastly. We are differently situated from those in trades and professions. If a boy goes to a farmer, and he puts him to plough for a year or two, he will make sad havoc with the drilling and horse-hoeing through his inexperience in laying a level stretch; but the moment he can do the thing as it should be done (having,

in the meantime, spoil the mouths and tempers of half-a-dozen good horses), he immediately starts on his own account, and becomes the servant of the first man who will give him 1s. 6d. more than his old master. In trades, the master, by agreement, secures to himself some years of service after the boy had learned the rudiments of his business. It is not very encouraging for a man to take a boy, teach him to plough, and then, when he is of some use, see him start off for some other sphere, only to leave the plough-handle vacant for the next to try his hand on ; but that is no reason why we should let the labourers' boy speak, move, and think at a pace 100 years behind the speed of any other mortal this side the Tweed. Let us impress on the boys that no such thoughtless answer as "don't know" and "can't" will be allowed ; make them speak sharp the moment they are spoken to, answer the moment they are called, and run the moment they are wanted. Take care to have this done, and point at certain penalties in case of disobedience—not the ash stick, or the box on the ears—probably that has been tried at home ; but give the boy to understand that unless he imbibes smartness he will be sent the first long errand on foot that turns up, or when the other boys are gone home he will have to stay at work half-an-hour alone ; and recollect that a well-judged word of praise goes a long way with a being to whom such words are rare. Two bright penny pieces to a lad whose only assets are a pocket-knife, a whip-stick, and a copy of Watts's Hymns, are a wonderful inducement to do a job quickly and carefully. Mr. Biddell spoke from personal experience. He had a weakness for boys, and had nine on a farm of about 270 acres. On these he had practised the system he recommended ; and if he had some full of mischief, some stupid, and others careless, if some were idle and others better disposed to work, if they were no better than boys differently treated, he knew they were brighter, more useful, quicker, and far more obliging than they were before he paid any attention to them. He did not believe they required to put wits into the heads of their rustics, so much as they wanted to make those wits work which they were already possessed of. A like attention paid to the morals and the manners of the boy, when under the control of the master, had a marked effect on the address and conduct of the lad. The habit of using bad language, cruelty, prevarication, and deceit should be shown in their true light, and on detection a master should seriously, firmly, but calmly, explain the consequences of such habits. The words of an earnest, dispassionate

man had a powerful influence for good on a lad to whom the oath and the ash stick were the common means used to impress new ideas on his mind. He strongly urged the importance of the personal influence on the part of the master; and, turning to education, while saying God forbid that he should raise a finger to retard the efforts of those who wished to extend to the meanest agricultural labourer the blessing of a knowledge how to write, he expressed his doubts whether the sanguine expectations indulged in by those who looked for a millennium of intelligence, elevation, and improvement by compulsory education, were not doomed to disappointment.

The following are abstracts of two Acts passed in the last session of Parliament, affecting agricultural labourers, for which place, therefore, should be found in these pages :—

“The Agricultural Gangs Act” came into operation January 1, 1868. No child under the age of eight is to be employed in a gang; nor females in the same gang with males, nor except under a female gangmaster, under a penalty of 20s. for each child or woman so employed. Gangmasters are not to act, except licensed. They are in no case to be keepers of public-houses. Licenses are to be granted by two or more justices for six months only. There are various penalties enacted for offences against this Act, which applies only to England.

The “Master and Servants Act” may apply to agricultural as well as other employments. It declares that wherever the employer or employed shall neglect to fulfil any contract of service, or wherever any dispute shall arise as to the rights or liabilities of either of the parties, or touching any misuseage to the person or property of either of the parties, the party feeling aggrieved may lay a complaint in writing before a justice; and the justice is to have power to award damages against, or impose fines on either party, to be levied under penalty of imprisonment. The Act may last till the end of the next session of Parliament.

V. COST OF FARM OPERATIONS.

In this section of the book it is proposed to state or estimate the labour-cost of various farm operations and results, naming the authority for each, except in those cases where the conclusion arrived at is derived from personal experience, or from simple

calculation. The data on which the calculations are based are first enumerated, and they are then applied to the following cases—the price guiding either the daywork or piecework payments:—Ploughing, harrowing, rolling, grubbing, horse and hand hoeing, sowing, reaping, mowing, harvesting, threshing, digging, draining, &c. And the calculated expense of the several operations is then employed in determining the labour-cost of the several crops—seed crops, root crops, forage crops, special crops.

24. Data on which the Cost of Agricultural Labour depends.—1. *Hand power.* The wages of an ordinary labouring man are assumed to be 2s. a day, except during about five weeks of harvest time, when they are put at 3s. 6d. to 4s. a day of ten hours. Those of a woman working in a field are 10d. a day of ten hours, except during harvest time, when they are 1s. 3d. to 1s. 6d. Those of a boy vary from 2s. a week, the wages of a “scare-crow,” up to perhaps 1s. 6d. or more per day, as he approaches manhood.—2. *Horse power.* The cost of a horse, as worked on the average, *i.e.*, under the varying circumstances of farm labour, with one man to a pair, or occasionally one to each animal, amounts to nearly 5d. per working hour throughout the year. The cost by horse power of 1 cwt. drawn (=lifted) $2\frac{1}{2}$ miles in one hour is about 6d. The annual cost of food—of extras, such as farriery, maintenance, saddlery, &c.—of guidance and management—and of maintenance of implements is £23, £5, £15, and £3 respectively, or £46 a horse; and this, if the working time be 2,400 hours, amounts in all to nearly 5d. an hour as has been said; if the time of labour be, as is estimated by some, 2,700 hours per annum, whether 300 days of nine hours each, or 270 days of ten hours each, then the cost is less than $4\frac{1}{2}$ d. per hour. If the mean of these figures be taken as a guide, then a pair of horses at 9d. an hour, and nine hours a day, will cost 6s. 9d. a day. And to this the figures of already published estimates sufficiently agree: thus Professor Low calculates the daily cost of a pair horses (for nine hours) at 4s. 8d., which, with ordinary wages for the ploughman, is nearly the same as the above; when the day is ten hours, the cost is, of course, so much more, or 7s. 6d. a day.—3. *Steam power.* Its cost varies considerably according to the size and quality of the engine. I do not quote the returns of what are called “racing” trials of the moveable and fixed engines of the different makers at the annual meeting of the Agricultural Societies, because, although an enormous power may be obtained from the consumption of a

very small quantity of coals under the particular circumstances of any given hour for which special preparation has been made, such results are never realised in ordinary practice ; and it may, therefore, be put down as the ordinary experience, that 1 cwt. of coals per horse power is consumed during a day of ten hours ; and that, in the case of eight to ten horse power moveable engines, the cost of coals, labour, water, oil, getting up steam, repairs, and moving from place to place, amounts to from less than 3d. per horse power in the larger engines, to 4d., or even more, in the case of the smaller engines ; varying also, of course, between even wider extremes than these, according to the price of coals in the different localities compared.

25. Cost of Farm Operations.—1. *Ploughing.* Let us suppose it capable of being done by a man and pair of horses, involving a draught (=a lift) of 3 cwt. for 10 miles per acre (four times the distance along which, according to the datum already determined, 1 cwt. can be drawn for 6d). It will cost $3 \times 4 \times 6d. = 6s.$ per acre. $1\frac{1}{2}$ acres should be done in 10 hours ; and this at $4\frac{1}{2}d.$ per horse per hour (the other datum) brings the cost $= 10 \times 2 \times 4\frac{1}{2}d. = 7s. 6d.$ per $1\frac{1}{2}$ acres, or 6s. an acre as before. If deeper, it may involve a draught of even 5 cwt., and then a wider furrow slice being taken, 8 miles are walked per acre ; 5 cwt. drawn 8 miles are equivalent to 16 cwt. drawn $2\frac{1}{2}$ miles, and the operation will thus cost 8s. an acre. Calculated the other way, 3 horses would probably be taken for the work, and they should do $1\frac{1}{2}$ acres a day in 10 hours, costing $3 \times 10 \times 4\frac{1}{2}d.$ or 11s. 3d., rather more than 8s. an acre. But these figures are much larger than are to be quoted against the operations if effected by steam power ; for we then calculate on 3d. per horse power per hour, and on a larger quantity of work being accomplished, owing to less loss of time on the headlands.

There is comparatively little service done by estimating the cost and performance of any of the kinds of apparatus for steam ploughing or steam cultivation in actual work during a single day ; but it may be now safely contended that the operations of both ploughing and grubbing land can be more cheaply done by steam power than by horses ; especially where, owing to the depth of work, or the stiffness of the soil, the labour is excessive. We may in fact safely estimate that steam power will generally plough land at probably 60 per cent. of the cost of ordinary horse power cultivation, and on stiff clay soils with nearly double the efficiency. The cost of steam power as compared with that of horses may be

3d. as compared with $4\frac{1}{2}$ d. for the same amount of force exerted : but in the case of steam ploughing, the loss of time on headlands is so much less as to raise the difference between the two thus much in favour of the former. And as to the quality of the work accomplished by them, it is becoming more and more the experience of steam-cultivators that the grubber driven by steam power is especially the tool for the production of tilth.

The state called tilth is however not altogether, nor even chiefly, an artificial thing. You might grind clods, and even rocks, to powder, but the powdered stuff would not be mould, nor would the condition to which the material would be thus reduced be the state we call tilth. The hardened soil must be moved, of course, by artificial means, broken into fragments, and the labour of such heavy work particularly adapts it to steam power ; but these fragments, large or small, must moulder down by the influence of the weather. It is a great mistake to suppose that steam power will be best applied to the work of cultivation by setting it to grind the hard ground artificially to powder. Even if this could be done, it would most likely end not in creating but in retarding tilth : the powdered soil would run together in a mass on the first rain which should thoroughly soak it. The great object of the tillage-farmer is to break his land up into dry fragments, on a well-drained subsoil, and then leave time and weather to do their work. Frost, with alternate rain and drought, on deeply-moved and well-drained land, are the real tillage implements. The soil is thus reduced from fragments and clods by the mere costless lapse of time into that condition of soft moistened mould which is best both as seed-bed and as feeding-ground for our crops.

It is the fitness of steam power for that preliminary artificial process by which the natural and final processes are enabled and facilitated, which renders it of such inestimable value to the tillage-farmer, and which will, especially on clay-land, make steam cultivation, following drainage, the inauguration of a new era of fertility and productiveness.

2. *Harrowing*.—A man and pair of horses will, with harrows of ordinary width, *i.e.*, covering about seven or eight feet, go over rather more than nine times the land turned over by the plough, although the width of the tool is not more than nine times the width of the furrow slice. Horses at harrow ought to, and generally do, travel faster than at any other farm operation ; we may therefore calculate on ten times the work of the plough being

done—equal, in a good day's work, to about twelve or thirteen acres; or, if a double turn be given on the same land, equal to six or seven acres thus treated. In the one case, then, the cost of ten hours' work (7s. 6d.) is 6½d. per acre, and in the other, 1s. 1d.

3. *Rolling*, if with one horse and a light five-foot roller, costs 3s. 9d. per day of ten hours, during which about six acres may be rolled, at a cost of 7½d. per acre; if with two horses and a six-foot roller, it costs 7s. 6d. per day of ten hours, during which eight acres may be accomplished at a cost of about 1s. an acre. If pressing after the plough be adopted, one horse will press after two ploughs; and as this is done, generally, previous to wheat sowing, when nine hours is the utmost time of a day's work, it accomplishes less than two acres, costing about 1s. 9d. to 2s. an acre. The clod-crusher (Crosskill's), drawn by three horses over rough cloddy land, will not accomplish so much, according to its width, as the common roller, and will cost at least 1s. 6d. an acre.

4. *Grubbing and Cultivating* may vary from a mere scarifying of the surface to a thorough disintegration of the soil to its full depth. Being done by horses, a pair, with Finlayson's so-called harrow, may get over four acres a day five inches deep, in the case of land already ploughed, thus costing less than 2s. an acre; or four horses may be needed, and Coleman's, Clay's, or Bentall's implement, stirring between three and four feet wide at a time, may accomplish three acres a day, six or seven inches deep, at 5s. an acre. This too, however, as has been said, is an operation perfectly manageable by steam power. Smith's (of Woolston) grubber accomplishes five acres of heavy land grubbing, and seven acres of light land grubbing with ease, by means of a seven or eight-horse engine. This is in the case of unploughed land, and, of course, involving an immensely heavier draught than is required in ordinary horse tillage, where the land may be said to be almost invariably ploughed first before the use of the grubber. The cost of grubbing by steam power varies from 3s. to 4s. an acre, in the case of stiff land. This is sufficient to pay for fuel, material of all kinds, and wages. To this must be added the cost of tear and wear of machinery. At the Bury Meeting (1867) of the Royal Agricultural Society, the use of very wide cultivators for light land cultivation by steam power was very strikingly illustrated. Travelling at the rate of four miles an hour, between two engines placed at either end of the field, Fowler's thirteen-tined cultivator accomplished the cultivation of

the land to a depth of about six inches, and the piece actually worked within the hour was or rather more than five acres. It is plain that these two engines, of ten and twelve-horse power, consuming at most a ton of coals a day, and involving at most the wages of five hands and the cost of a horse and cart, cannot anyhow be made to expend more than 50s. a day in current outgoings. But this is not more than 1s. an acre of the extent of land which, on the large fields of light land in the eastern counties, they will be able to get over with their cultivating tool.

5. *Hoeing*.—The hoeing of corn by Garrett's horse hoe, with attendant lad to lead the horse, costing about 6s. a day, will cost in general considerably less than 1s. an acre. One-horse hoeing between the drills of turnips, where one interval is thus grubbed at a time, will generally be done at the rate of three acres a day, and may therefore be estimated at 1s. 6d. an acre. To hand-hoe drilled corn costs from 3s. 6d. to 5s. an acre, according to the nearness of the rows and the softness and cleanness of the land. To hoe, and at the same time single turnips sown broadcast, costs from 8s. to 10s. an acre, according as three hoeings are needed, the second and third being done some weeks after the first, when a second cleaning may be necessary, and an additional singling may be needed. To hand-hoe, *i.e.*, single the rows of drilled turnips, costs 3s. to 3s. 6d. an acre. The second hoeing in this case, which overtakes the land left by the horse-hoe, may be done for 2s. an acre. To hand-hoe potatoes, *i.e.*, hack the intervals between the rows deeply with a heavy adze-like tool, costs about 8s. an acre; to earth them up, which is done with a wide hoe, costs about 5s. or 6s. an acre. Both of these operations may be done in part by horse-drawn implements—the horse-hoe to grub the intervals, leaving the mere line of the young plants to be hoed by hand, and the double mould board plough to earth up the plants as soon as they are high enough. There is thus horse work equal to a double horse-hoeing, besides the partial hand-hoeing, in place of the hacking and moulding up all by hand, or probably 7s. or 8s. worth of labour in place of 14s. or 15s. worth.

6. *Sowing*.—This, as done by the Suffolk drill, generally requires three horses, two men, and a boy, costing 12s. 6d. to 13s. a day. A cart-load of grain will be needed for the day's work, which may cost two hours of a man and horse, or 1s., to place in position in the field, and this will make the daily cost 13s. 6d. The work done will rarely be more than 10 acres, and it will cost 1s. 4d. to 1s. 6d. an acre.—The sowing of

turnips by a double rowed turnip-drill, is done by one horse and man at the rate of 6 acres a day, and need not cost more than 9d. an acre.—The dibbling of mangold-wurzel seed by hand is done at the rate of $\frac{1}{3}$ to $\frac{1}{4}$ of an acre a day by each woman employed, and may thus cost from 2s. 6d. to 4s. an acre.—The dibbling of corn by hand costs variously, according to the implement employed. Where one hole is made at a time, and the rows are far apart, as in bean setting, and the labourer dibbling also drops the seed, it may cost 5s. or 6s. an acre. When a man using two dibbles walks backwards, making two holes at a time 9 to 10 inches apart one way, and 4 or 5 the other, followed by children dropping the seed, it costs from 5s. to 8s. an acre, according to the distance of the rows. Where Dr. Newington's seed dibble is used, covering about 2 feet at a time, the rapidity of the process is greatly increased, and its cost reduced more than one-half.—In Gloucestershire a good deal of wheat is hoed in. The man, using a flat hoe, and carrying an apron full of grain, makes a hollow track across the land, sows a handful of corn, and covers it with the earth moved in making the next track one foot further on. This costs about 8s. an acre.—Broadcast sowing may be done at the rate of 16 to 18 acres a day; and a man served by a lad with seed which has been placed out in bags by two hours' labour of a man and horse, will cost in wages and horse labour altogether about 4s. 6d. to 5s.; so that the cost varies per acre from 3½d. to 4d. per acre.—Clover seed and grass seed sown by a seed-barrow covering 1 perch wide at once, will be accomplished easily by one man at the rate of 2 acres per hour; or, taking the cost of placing the seed in the field for him, at the cost of not more than 2d. per acre.

7. *Cutting and stooking corn* costs from 7s. an acre for a light crop up to more than double that sum for a heavy and tangled crop. The process is each succeeding harvest more and more being done by reaping machines, and the cost varies according to the crop, the machine employed, and the skill in using it.

Mr. Clare Sewell Read, M.P., of Norwich, writes thus of his experience with Burgess and Key's reaper during three years:—

"I use six horses for the machine, three off and three on; they are changed four times a day, as they start at 5 A.M. and keep on cutting till dark, stopping, of course, for breakfast, dinner, and at 4 o'clock. We don't value horses much during the early days of harvest, and I put down the six at 18s. per day. Two men or strong lads attend to the machine; one to drive it, and the other walks behind, turns the corners properly, and sees that all goes

right. These men change places as they please. A tiny boy rides the fore horse. An old man, with a scythe, rounds off the corners. I have cut, on an average, 15 acres of wheat per day, the cost for labour being :—

	£	s.	d.
" 6 horses	0	18	0
2 men	0	9	0
Boy	0	0	6
Old man	0	2	6

Or 2s. per acre.

1 10 0

"Then there are the following annual charges against the machine :—

	£	s.	d.
"Repairs, wear, and tear	2	0	0
New knife	1	0	0
Oil	0	5	0
10 per cent. on £42	4	4	0
	7	9	0

or 1s. per acre on the 150 acres I cut ; but I may add that my present machine has not yet cost me sixpence for repairs, and that I have only had one new knife in three years.

"Again, as to binding. I do this principally by women and girls; they have 1s. 4d. a day, working about nine hours. Two women will tie up an acre and a half in a day, so the binding by women costs only 2s. per acre ; but, when I have to employ the men for that purpose, they make the cost per acre come to about 3s. 3d., for our men are hired by the harvest (having £6 for securing the crop, which seldom extends over a month), and so they earn 5s. per day. Then there is the drag-raking and the stooking (or, as we call it in Norfolk, 'shocking in'), which may be put down at 6d. per acre ; so that the total cost of cutting and binding and setting-up is, per acre, 5s. 6d., when women are employed, and nearly 7s. when the men bind the corn. Before I had a reaping-machine I put out to strangers, who are never seen now, about forty acres of wheat to cut and tie, which cost me generally £8. Since then I have increased the farm to the extent of thirty acres more corn yearly, and I hire two men less, but four more women, making a total of £35 saved ; from this deduct £10 for horse-labour, and £5 for wear and tear, and that leaves £20 clear profit. My harvest now costs 10s. 6d. per acre (including thatching), formerly 12s. 6d.; 2s. per acre on 350 acres is £35, which agrees with the other figures."

The following account of harvest work is by Mr. Jacob Wilson, M.R.A.C., of Manor House, Woodhouse, Morpeth :—

"I use a Burgess and Key's reaper, which cuts about 350 acres per annum, at an average of $13\frac{1}{2}$ acres per day. My corn is all sheafed by long-toothed rakes, much easier for the labourers, and doing a greater quantity per day. My staff of hands consists of my usual farm-staff, viz., twenty-seven persons—nine boys or girls, nine women, and nine men, besides the man and boy with the machine. These work in gangs of three, and are arranged in systematic order as follows :—1, a boy or a girl to make bands; 2, a woman to sheaf the corn; 3, a man to bind and stock. By this means, nine swathes are taken up at once, and, as the machine generally works around the field, they also go around, but in the opposite direction. I have found that a gang (a boy, a woman, and a man) can sheaf and stock—when nicely laid—two acres per day, or on an average an acre and a half per day each—the nine gangs doing thirteen acres per day together."

I add the following account of work with Cuthbert's reaper on one of Lord River's farms, near Salisbury, given to me by Mr. Chadwin of Tollard Royal.

He says, "The reaper used by Lord Rivers upon one of his arable farms of 600 acres, is one of Cuthbert's one-horse reapers, which has proved itself a very clever and efficient implement, going through the whole of the past harvest without costing a fraction for repairs; cutting crops, which were very much laid, in the most satisfactory manner.

"The following figures will show the difference between hand-mowing and horse-reaping on this farm :—

By Hand-Labour.

Reaping, tying, and stooking, 10s. to 12s. per acre.

Mowing, tying, raking, and stooking, 7s. to 9s. per acre.

By Machine.

This reaper averaged about 10 acres per day :—

	£	s.	d.
2 men at 5s. each per day	0	10	0
1 boy	0	1	6
Oil, say	0	0	4
Food of 2 horses	0	4	0

For 10 acres 0 15 10

Or, per acre for the cutting, 1s. 7d.

For tying, stooking, and raking, 3s. 6d.

Total cost per acre by machine, 5s. 1d."

Mr. Chadwin adds, "Although this reaper is called a one-horse implement, it in reality needs two horses per day, the work being too hard for one, therefore they relieve each other at intervals; this is the usual practice, but I have found it much the best plan to feed the horses highly, and work them both at the same time throughout the day. The pace is quicker, the horses are less fatigued, and fewer stoppages occur. I do not work the same pair of horses two days in succession."

8. *Mowing* by machinery, when the circumstances are favourable, may be done at the rate of ten acres a day with a man and a pair of horses, and therefore costs less than a shilling an acre. By hand it costs, according to the table in page 117, from 2s. 6d. to 8s., and even 10s. an acre, according to the crop. Mowing meadow land is generally somewhat slower work than mowing clover, involving waste of time by the need of a more frequent sharpening of the scythe, and also in an equal crop the need of greater power; the higher price, therefore, goes to the meadow grass, and the lower price to clover.

I give one report of Burgess's mowing machine, only adding that Wood's, and other novel machines, are equally well spoken of by those who use them.

Of Burgess and Key's mower, Mr. Horswell, of Tavistock, writes as follows:—

"It answered admirably, and, though the season was very bad, I never saved hay in better condition, or with so little labour. During the eight days' uninterrupted fine weather in July (the only fine weather for the season), when men could be scarcely obtained, and for the mere labour of cutting 8s. or 10s. per acre had to be paid, I got in fifty-six acres with the aid of the mower, hay-tedder, and hay-gatherer—(the cost in manual labour, in getting it ready to be carried, did not exceed 1s. per acre), and it had no rain upon it whatever—and there were twenty-four acres besides with very little damage, all secured before the heavy rains set in. Without the aid of machinery, twenty or thirty out of the eighty acres would be the most that I could have possibly saved in good condition. Where the surface is moderately even, we can set the machine so low as to cut four or five cwt. of hay per acre more than the best men can do in the ordinary way. Since I have availed myself of the machinery that there is to aid the agriculturist, I can comfortably complete my harvesting with the labourers regularly employed on the farm."

9. *Harvesting*.—In addition to the mowing and reaping of the

crop, there is the cost of preparing it for the rick, and the carrying it there.

The labour of pitching sheaves to the cart or waggon, and building them there, and pitching from the cart or waggon to the rick, may be let to gangs of three—two men and a boy (one pitcher and one builder in the field, and one pitcher at the rick)—and need not cost more than 1s. 6d. an acre in the heaviest crop. I have let the pitching of 140 acres of wheat, barley, beans, (generally bulky crops), in this way generally for £7, or 1s. per acre, and it never costs me more than 1s. 2d. In addition to this, of course, there was the building on the rick, generally by one man and a boy, whose day's work would amount to about 8d. per acre; and one lad and three horses to carry the corn and lead the carts to and fro, costing about 8d. an acre, and the thatching 3s. a rick of every thirty sacks, or 1s. an acre; while the previous "leasing," or preparation of the straw, would be about one-third of this, or 4d. an acre.

The whole process of harvesting, as it may be thus conducted, would thus cost:—

Cutting by machine, and tying and stooking	...	...	s.	d.
Pitching and loading	...	...	6	0
Rick building	...	...	1	0
Carrying	...	...	0	8
Thatching	...	...	0	8
	...	...	1s.	to 1 4
In all, per acre	...	...	9	8

As it is actually still conducted, unavoidably indeed, in many instances, owing to a bulky and laid crop the reaping alone may sometimes cost 15s. to 20s.—the carrying and building may cost 3s. or 4s. more—the thatching at 1s. per "square," *i.e.*, ten feet by ten feet, may cost rather more than 1s. an acre; and, in all, the expense of harvesting may be more than double what has been named.

It is a common contract in Gloucestershire to cut and carry hay, and build it in the rick—the farmer supplying horses—for 10s. an acre, so that the mowing costing, say 3s. 6d., the harvesting costs 6s. 6d.; but such a contract is a mere speculation—as, though 10s. may represent the average cost, yet it varies in actual experience from 5s. to 20s., and more, according to the weather.

In Middlesex, where the best hay in the world is made, the usual charge per acre for hay-making is at least double the Gloucestershire average.

Harvesting root crops, viz., the pulling, topping, and tailing, and throwing into carts, swedes, mangold-wurzel, and carrots, good crops of each, or respectively, twenty, thirty, and twelve tons per acre of each may cost 7s., 9s., and 20s. per acre, respectively.

I may give here, in illustration of this point, a detailed statement of my own experience during a single season, when twenty-nine acres of mangolds and 11 acres of swedes had to be carted off:—

The following is an account of the hands employed by the contractors in lifting 40 acres of mangolds and swedes, and the time they took to do the work, and the tons of roots placed in the store. Having a weighing machine, we weighed several cart-loads every day; the cart without its wings measured just a cubic yard; the ground was dry, and the work was either on level ground or on a gradual descent, so that the cart-load weighed twenty-two, twenty-three, and twenty-four cwt., including the earth left about the roots after they were cut off, which might be two, three, or four cwt. each cart. We, therefore, took every cart-load at a ton.

THE TIME AND NUMBER OF HANDS USED BY THE CONTRACTORS IN HARVESTING 30 ACRES MANGOLD AND 10 ACRES SWEDES.

18—.		Men pulling.	Women and Boys cutting Roots.	Filling the carts.		Acres.
				Men.	Women and Boys.	
Oct.						
17	Taking up Mangold, No. 6 field	5	10	1	9	} 11
18	„ „ No. 6 „	5	10	1	9	
19	„ „ No. 10 „	5	10	1	9	} 11
21	„ „ No. 10 „	5	10	1	9	
22	„ „ No. 2 „	5	10	1	9	} 5
23	„ Swedes, No. 2 „	} 5	10	1	9	
	„ „ No. 22 „					
24	„ „ No. 24 „	5	10	1	9	} 14
		40	70	7	63	

The contract was for 29 acres of mangold, at 6s. 6d. per acre	£	s.	d.
Ditto ditto 11 acres of Swedes, at 5s. 6d. „	9	8	6
Total	£12	9	0

THE WAGES EARNED BY THE CONTRACTORS, AND PAID BY THEM TO THE HANDS THEY EMPLOYED.

	£	s.	d.
47 days of a man at 2s. a day	4	14	0
70 days of a woman at 10d. per day	2	18	4
63 days of a boy and girl at 9d. per day	2	7	3

Total £9 19 7

Leaving £2 9s. 5d. to be divided amongst the contractors more than their daily wages of 2s.

THE EXPENSE OF HAULING THE ROOTS TO THE STORE.

No. 6.	3 days of 3 horses = 9 days,	306 tons from 11 acres.
„ 10.	1½ day of 5 „ 7½ „	242 „ „ 10 „
„ 2.	1½ day of 5 „ 7½ „	190 „ „ 8 „
Nos. 22 } and 24. }	2 days of 6 „ 12 „	192 „ „ 11 „
	36	930
		40

930 loads or tons carted by 36 days of 1 horse, is 26 loads per horse per day.

THE EXPENSE OF CARTING 930 TONS OFF 40 ACRES OF MANGOLD AND SWEDES.

	£	s.	d.
36 days of a horse and cart at 3s. per day	5	8	0
7 days of a man to back and tip the carts in the stores at 2s.	0	14	0
17½ days of a boy leading carts at 8d.	0	11	8

Or at the rate of 3s. 4d. per acre £6 13 8

THE EXPENSE OF STORING THE LOADS AND THATCHING THEM.

	£	s.	d.
3 men 7 days, 21 days of a man, at 2s. per day	2	2	0
2 boys and 2 women, 7 days each, 28 days at 10d.	1	3	4

Or 1s. 7½d. per acre £3 5 4

So that the total expense of harvesting our root crop of 40 acres, was for pulling, &c. }	£	s.	d.	s.	d.
For carting 930 tons home	12	9	0	6	3
For storing them	6	13	8	3	4
	3	5	4	1	7½

The expense of harvesting 40 acres of roots £22 8 0 or 11 2½ „

It may be added that when turnips are drawn in the autumn and thrown together in small conical heaps, and covered over for consumption on the ground in spring, the whole process may be let for from 5s. to 7s. 6d., according to the crop, per acre.

Harvesting carrots and parsnips costs in mere pulling and topping and tailing, from 20s. to sometimes a much larger sum an acre, in place of the 7s. or 8s. which swedes and mangold-

wurzel may cost. The labour of carrying and pitting the smaller crop is, of course, considerably less, but in all, the 11s. or 12s., which is the cost of the mangold-wurzel crop, is replaced by more than double that sum in the case of the carrot crop.

Harvesting potatoes may cost 20s. to 24s. an acre to dig, sort, pick up, and fill into carts. This, however, is the experience of Gloucestershire, where there is an especial dexterity in using the potato fork; and if men be employed to dig and gather too the cost may be much more. Where Hanson's potato digging machine is employed, the cost is considerably reduced; and two-thirds of the expense—that of digging, 15s. to 16s. an acre—is at once reduced to three or four hours' work of a man and two horses, or about 2s. 6d. an acre. The cost of an additional harrowing and picking after the harrow, or perhaps 2s. extra, must be added to this, making the cost of digging and picking up altogether not more than 10s., in place of 20s. to 24s. per acre. To cart home and pit may involve an expenditure of probably 5s. or 6s. extra.

10. *Carriage*.—A man and pair of horses in carts or waggon may carry two tons along a good road twelve miles; and that, with the return journey, will be a day's journey at a cost of 4d. or 5d. per ton per mile. Carriage on farm roads and over fields costs much more. In the instance already quoted 930 tons of mangold-wurzel were carried home for about £6 13s. 8d.; this would be from an average distance of about a quarter of a mile. 230 tons carted one mile for £6 13s. 8d. is as nearly as possible 6d. per ton per mile. But this is probably the minimum expense of carriage on a farm, where the system is perfectly organised and hurried along by contract work. Three horses and one boy going to and fro will lead one acre of a good crop of corn, per hour, weighing probably 50 cwt., a distance of a third to half of a mile; the cost will be about 1s., and 50 cwt. carried one mile cost, therefore, 2s. or 3s., or from 10d. to 1s. 3d. per ton per mile. Here, however, there is the slow gathering of the load, and the waiting at the rick to interfere with rapid work.—The carting of 120 cubic yards=60 or 70 tons of dung, is done by three horses and one man and a boy in a day, to a distance of one-third of a mile, costing about 9s. or 10s. There is thus a charge of nearly 6d. per mile against every ton of it. Here, too, there is a well-arranged system and contract work to hurry it along. In ordinary cases carriage on good roads may be charged at from 4d. to 6d. per ton per mile, and on bad roads or fields from 8d. to 1s., according to circumstances.

11. *Threshing*.—This, if done by hand, varies according to the grain and the bulk of straw. The work is done now almost wholly by machine; but the following prices may still be quoted as actually paid for hand labour in threshing by flail and dressing:—

	s.	d.	s.	d.
Wheat	2	6	to	4 0 per qr.
Barley	1	3	to	1 6 „
Oats	1	0	to	1 4 „
Beans and Peas	1	0	to	2 0 „

By steam power (moveable engine) the cost may be stated thus:—

Hire of 8-horse engine and machine, with engineer and feeder	£	s.	d.	£	s.	d.
Cost of coals, say	0	8	0	1	15	0
Cost of water (one man and horse half his time)	0	2	6			
					0	10 6
2 men and 2 lads unloading rick, and pitching to feeder, and opening sheaves	0	6	0			
1 man attending to sacks	0	2	0			
1 man and horse removing corn	0	5	0			
Labour of removing straw and chaff, and building the former, equal to 6 men ...	0	12	0			
					1	5 0
					3	10 6
Beer, 6 gallons					0	6 0
					£3	16 6

For this sum, from forty up to even sixty quarters, according to the yield, may be threshed for 1s. 6d. to 2s. a quarter.

In the case of the fixed engine, the charge for power may be put at about £1 a day for a 6-horse or 8-horse engine. In the latter case forty quarters could be easily threshed per day. The cost of labour being:—

4 men, 2 boys, 2 women, and 3 horses to deliver the opened sheaves to the feeders from the corn stack ...	£	s.	d.
1 feeder	1	0	0
3 women and 2 men to remove the straw and build it in the straw-house	0	2	6
2 men to attend to the removal of the grain to the granary	0	6	0
	0	4	0
Labour			
Beer, 6 gallons	1	13	6
Power	0	6	0
	1	0	0

Total cost, about £3 0 0

or about 1s. 6d. a quarter.

In another case known to me—

	£	s.	d.
2 lads brought the corn to the elevators in a railway truck	0	3	0
1 woman fed the elevator	0	0	10
2 women supplied the feeders with the open sheaves ...	0	2	0
1 feeder	0	3	0
3 women received the straw from the shaker	0	2	6
And 1 man built it in the straw-house	0	2	0
The engineer took the wheat to the granary	0	0	0
<hr/>			
Labour	0	13	4
Power	1	0	0
<hr/>			
Total daily cost	£1	13	4

For this sum about 140 cubic yards were threshed in a day—a quantity which yielded, say from 15 to 20 quarters, so that the cost varied from 1s. 8d. to 2s. a quarter.

Sometimes machines and engines are let out at so much a quarter; and a common charge is 1s. 4d. a quarter for wheat, and 10d. for oats or barley, or 3d. more when Hayes's Elevator is used for removing the straw. In either case two men (the feeder and the engineer) are included in the hire. The additional hands required are for supply of water and removal of grain; also for bringing the sheaves to the feeder, just as in the first case quoted, costing, therefore, 13s.; and, besides these, two men will be needed to build from the straw elevator, and this, with the beer supplied, amounts to 11s. 6d. and the coals may cost 8s., so that the additional charge is equal to 32s. 6d., or 9d. a quarter upon a probable day's work, making the cost on the whole rather more under this plan than when a fixed charge (generally 35s. a day) is made for the use of the engine.

Threshing is sometimes done by the acre—5s. 'an acre being about the price given for the use of machine and engine, with engineer and feeder, when the whole crop (wheat, barley, oats, and beans) is let together.

The threshing of grain by machine in cases of ordinary yield may thus be put at 2½d. to 3d. per bushel for wheat; while it is less in the case of those crops which yield more grain to a given bulk of straw. The immense superiority of machine and steam power threshing over hand labour consists not so much in the diminished cost per bushel as in the greater quickness of the process, and the ability thus at once to supply the market without materially interfering with the ordinary labour of the farm, and without exposing the labourers to a constant temptation to

dishonesty. An extra winnowing is almost always required, and it may be done as fast as two men can measure up and sack and wheel away the sacks. Two men can winnow probably 60 or 70 quarters a day, and four men, whose wages are 8s., will thus measure up at the rate of $1\frac{1}{2}$ d. to 2d. a quarter. If the wheat needs "reeing," in order to get the chaffy grain and weeds out of it, this will require a man's wages for every eight or ten quarters a day, according to the filth to be removed, and it may thus cost 2d. or more per quarter in addition to the winnowing.

12. *Digging*.—This costs various sums, according to its quality and depth, and the stiffness of the soil. When the soil is just turned over with a light spade, without using the foot, it may be done for 1d. per perch ($\frac{1}{160}$ of an acre)—the depth not being more than two or three inches. When it is dug over with a spade to the depth of five or six inches, the foot being used, and the land being in fair working order, it will cost at least 2d. per perch = £1 6s. 8d. per acre, and will generally cost £2 an acre. This also will be the price of forking rather deeper when the land is in a tolerably friable state.

If the grafting tool—a long straight narrow spade, taking a spit at least ten inches—is used, it will cost from 3d. to 4d. per perch.

Trenching is done by two labourers, a man and a lad. A trench two feet wide and six or seven inches deep is dug, and the topsoil removed to the other side of the field. A man working in the trench digs the subsoil over ten inches deep with the grafting tool, taking the full width of the trench and digging from one end of it to the other. A lad digs the topsoil of the next trench with the common spade, throwing the whole of the earth so moved on to the top of the dug subsoil, and so opening a new trench for the man. The lad may receive 3d. a perch and the man 5d. a perch for his work—the former may earn 1s. 6d. and the latter 2s. 6d. a day—and the cost per acre is thus £5 6s. 8d.

Paring with a breast plough costs from 7s. or 8s. an acre in the case of stubble or light soil—to 15s. or 18s. in the case of tough old sward. And we may add here that burning may be contracted for at about as much, thus doubling the cost. It is understood, however, that the farmer harrows over the pared ground before the burners gather it and burn it.

Where stifle burning is adopted, the labour is so much the more tedious and the cost is greater; but the actual amount depends altogether upon the quantity of material burnt on a given extent of ground. Stifle burning consists in collecting the clods

of cultivated land in limestone districts, and with these, and afterwards with finer earth, covering heaps of weedy rubbish, to which fire has been set by a wisp of burning straw. The heaping, burning, and spreading the ashes are generally done by the piece, for 12s. to 14s. an acre. When clay land is burned in heaps, with coal or wood as fuel, it costs about 6d. per cubic yard, measured after burning, and 1d. per cubic yard for fuel, and 2d. per cubic yard for spreading the heap over the land.

Earth work generally, where the pick-axe is not used, may cost about 2d. a cubic yard to lift and place, and it will cost 1d. per cubic yard for every thirty yards run to wheel it away. This will apply to calculations for making wide open ditches not very deep; and when the grafting tool or shovel alone are used, *i.e.*, when there is no rock or subsoil needing the pickaxe. In the case of narrow and deep trenches, as for draining, the cost is more, as the workman labours under disadvantages. And a 4-foot deep drain, to take a 2-inch tube at bottom, in a clay or loamy subsoil without stones, will cost from 6d. to 8d. per perch to dig, which is 3d. to 4d. per cubic yard.

To turn dung heaps will cost from $\frac{1}{2}$ d. to $\frac{3}{4}$ d. per cubic yard (measured after the work is completed, and it has sunk to its natural solidity), according to the strawyness of the heap. Where the hay knife is needed to cut it out in successive slices, and it has then to be thrown, as in cattle boxes, into carts or into the yard, it will cost $\frac{3}{4}$ d. per cubic yard.

Well-made dung may be filled into carts for 7s. 6d. per 120 cubic yards, which is just $\frac{3}{4}$ d. per yard, and good labourers will make 2s. 6d. a day at this wage.

Dung may be spread at the rate of 1s. 6d. to 2s. 6d. per acre, according to the heaviness of the dressing; and it may be spread in rows in the turnip-field by one man and three lads, as fast as three men at the carts can fill them; *i.e.*, for about the same wages, or $\frac{3}{4}$ d. per cubic yard, or from 1s. 6d. to 2s. 6d. per acre, according to the dressing.

There are other works which may perhaps come under this paragraph, such as digging and grubbing up old hedgerows, and works of that class; but it is impossible to give any information of the cost of such work without seeing the character of it. It may cost from 1s. to 3s. per running perch, according to the width of the fence which needs removal. And it may be added, that the same uncertainty and variety attends the converse employment of repairing, renewing, and pleaching fences to remain,

which a man will do at the rate of three up to eight or ten rods, or perches, a day, according to its laboriousness.

13. *Live Stock Management.*—The shepherd will shift the hurdles and troughs for chaff, and peck the turnips for 300 or 350 sheep folded on turnips, having the daily supply of hay chaff cut for him, and brought to him in the field. Attendance on feeding sheep may thus be estimated as costing $\frac{1}{2}$ d. per sheep per week, and $\frac{1}{2}$ d. more in cutting chaff, &c., when they receive other feeding. And where sheep are kept in yards, and cut turnips are supplied to them in troughs, the cost will not be much more. A man and boy can clean and cut with Gardner's turnip-cutter from three to five tons of roots a day, and supply them in three meals, and keep the bedding trim; and this will suffice for 300 to 400 sheep. When sheep are folded on the land, and also fed on cut turnips in troughs, there is a double labour, and it will need a man and boy to attend on 300.—Shearing sheep varies with the size and weight of fleece, from 3s. 6d. to 4s. per score.—The labour of attendance on fattening cattle, when a mess of chaff and meal and steamed roots is given once or twice a day to beasts in stalls, and cut roots are given twice or thrice a day, at the rate of half a cwt. or so to each, and a little hay uncut is also given, may be estimated at 1d. a day to each beast; that is to say, a man and boy will look after forty beasts in boxes, if there be conveniences for feeding them, and supplying them with straw and water. In this case there is no labour of clearing out the soiled litter, for that accumulates under the cattle, and is covered daily with fresh straw.

Attendance upon dairy stock is measured by the number of milkers needed. One at least is required for every twelve to fourteen cows. A dairymaid and helper can make the cheese for a dairy of 100 cows, and the milking employs nearly all the hands on a pasture farm.

Recapitulation.—The following, then, are, in figures, the principal statements of the foregoing paragraphs:—

						s.	d.	s.	d.	
Ploughing	per acre	6	0	to	8	0
• " by steam	"	4	0		8	0
Harrowing (a double turn)	"	1	1			
Rolling	"	0	8		1	6
Drill-pressing	"	1	9		2	0
Grubbing	"	5	0		8	0
" by steam power	"	3	0		6	0

		s.	d.	s.	d.
Paring, by horse	per acre	3	0	to	4
Horse-hoeing corn	"	1	0		0
" " turnips	"	1	6		
Hand-hoeing corn	"	3	6	5	0
" " turnips three times	"	10	0		
" " " once	"	3	0	3	6
" " potatoes, deeply	"	8	0	10	0
" " (earthing up)	"	6	0	8	0
Sowing corn (by Suffolk drill)	"	1	6		
" " turnips (2-rowed drill)	"	0	9		
Dibbling mangold-wurzel	"	2	6	4	0
" " beans	"	5	0	8	0
Hoeing in wheat	"	8	0	10	0
Sowing corn broadcast	"	0	3	0	4
" " clover	"	0	2		
Cutting and stooking corn by hand	"	8	0	16	0
" " " by machine	"	4	0	8	0
Mowing clover	"	2	6	6	0
" " grass	"	3	0	8	0
" " " by machine	"	1	0	1	6
Haymaking (including mowing)	"	10	0	25	0
Pitching corn in sheaves from field to rick	"	1	0	1	6
Building corn in rick	"	0	8		
Carriage from field	"	0	8	1	0
Thatching	"	1	0	1	4
Carriage per mile	per ton	0	6	1	0
Harvesting swedes, mangold-wurzel	per acre	10	0	14	0
Pulling and filling carrots	"	20	0	25	0
" " potatoes	"	20	0	25	0
Threshing by hand, wheat	per qr.	2	6	4	0
" " barley	"	1	3	1	6
" " oats	"	1	0	1	3
" " beans and peas	"	1	3	1	6
" " by steam power, wheat	"	1	6	2	0
Winnowing	"	0	1	0	1½
Digging, turning in	per perch	0	1		
" " deeper	"	0	2	0	3
Trenching (two spits)	"	0	8		
Turning dung	per cubic yard	0	0½	0	0½
Filling "	"	0	0½		
Paring (breast plough)	per acre	7	0	15	0
" " (horse plough)	"	3	0	6	0
" " and burning	"	12	0	30	0
Digging ditch	per cubic yard	0	2		
" " drains, 4 feet deep	per perch	0	6	0	8
Live Stock.—Sheep feeding, weekly	per head	0	0½	0	0½
" " Cattle ditto	"	0	7	0	8
" " Sheep shearing	per score	3	6	5	0

To this table I add, for the sake of comparison, the testimony of two or three of Mr. Howard's correspondents, and the prices

paid by them and reported by him to the London Farmers' Club on the occasion to which I have already referred.

The following is from Mr. Battams, of Carlton, one of our most successful farmers, who had recently retired from business leaving his sons in large farms. He says:—

“Although I have thrown the plough in the ditch, I will refer to my labour-book, and give you the prices paid upon my farms for piece and day work. I will commence with my first operation, grubbing up about sixty acres of woodland. This cost £8 per acre. It was then drained four feet deep, at 2s. 6d. per chain. I next dug with spade ninety acres of old grass covered with ant hills. This was done at £2 to £2 2s. per acre. It was then drained four feet deep, at 2s. and 2s. 3d. per chain. The old ploughed land was drained the same depth, and at the same price, except where the pickaxe was used. This cost 3s. 6d. to 4s. per chain. The above was extraordinary farm work. I had more than 100 men employed at one time, my sons superintending the work. It was done well; and the men earned 12s. to 15s. per week, and some even more, in the winter months. I now come to ordinary farm work, done by the piece:—Trimming hedges, 2d. per chain; singling turnips, and hoeing the side of the ridge after the horse-hoe, 5s. to 6s. per acre; topping and pitting turnips, 6s.; mangel-wurzel, singled by the day, and for pulling, topping, and placing in rows for carting, 3s.; bean dibbling, two feet apart, when the rows are marked out, 3s. 6d., if unmarked, 4s. 6d. per acre; hoeing ditto twice after the horse-hoe, 6s.; mowing clover, 2s.; mowing grass, 2s. 6d. to 3s. per acre, with three pints of beer per day; mowing, sheafing, raking, and shocking wheat, barley, and oats, 7s. to 8s.; pea hooking, 4s. 6d. to 5s. 6d.; bean hooking, 7s. 6d. per acre, with four pints of beer per day; thatching, 1s. per square of 100 feet, with beer; harvest carting, 3s. 6d. per day; ordinary day labour, 11s. per week; men attending the steam engine, 15s. per week, with beer; horsekeepers and shepherds, 12s. per week, with house and garden rent free. I think it desirable to have work done by the piece where practicable; but I find three-fourths of the ordinary work of the farm is performed by the day, and I cannot well see how it is to be avoided, with so many men attending stock, and the threshing, chaff-cutting, grinding, and a great part of the cultivation of land done by the steam-engine; but even this day labour may be done very satisfactorily, where a good feeling exists between the master and the men, the former devoting sufficient time to the superintendence

of the workmen." Mr. Battams adds, "I have not noticed the cost of paring and burning old grass land, as I think the necessity of doing it almost exceptional. I prefer double ploughing ; what I have burnt cost £2 an acre."

The following, again, is from Mr. Hudson, of Castle Acre, Norfolk. He says :—

"There is not so much piece-work done on the farms in this district as in former times ; but we prefer that system when the men will take the work. The drilling is done by the acre. The man who leads the horse, and the man who guides the drill, are paid each 3d. an acre, if the work is done well ; they earn about 3s. a day each. Fencing is paid for by the rod of seven yards, at from 9d. to 1s. a rod. The manure is filled by the load, at 1½d. per load ; manure heaps turned over at 1d. per load. Turnips are hoed out at 2s. per acre, and singled by hand at 1s. 6d., and hoed round each plant at 3s. an acre, besides being horse-hoed three or four times between the ridges. Clover is mown at from 2s. to 3s. 6d., and 4s. an acre. The harvest work is taken by the men on the farm, who cut the barley and oats, and pitch, load, and stack the whole of the crop, including wheat, at from £6 to £6 10s. per man, the wheat being cut by machines, and tied up by women, at from 2s. 6d. to 3s. an acre, according to crop. Barley is gathered and heaped at 6d. an acre. In the autumn the swedes are placed in rows of from six to eight drills together, at 2s. 6d. an acre. If topped and tailed, and loaded on carts, or heaped ready to cover up, 4s. an acre [extra?]. Stones are gathered from the clover, and put at once on carts, instead of being laid on the ground in heaps, at 1s. per load of twenty-four bushels. Hay stacks are thatched at 4d. a yard run at the eaves ; corn stacks at 5d. per yard run."

Mr. C. S. Read writes :—

"Very little ploughing is done by the piece, certainly not with horses ; but many farmers put out ploughing to their bullock men, the bullocks being changed four times a day, and four bullocks being allotted to a plough, the price varying from 1s. 2d. to 1s. 8d. per acre, the depth and stiffness of the land of course regulating the price. I am in favour of well-paid piece-work, and a comparatively low price for daily labour ; if your day's pay is high, the men do not like to take piece-work, and having piece-work is the only way we can make the proper difference between the good and indifferent labourer."

26. Labour-Cost of Crops.—We have now to apply these

particulars to ascertain the labour-cost of different farm crops. For some of the crops named it will be necessary to add information on particulars not yet mentioned. I shall not pretend to specify all the crops known to English agriculture; the following estimates relate only to the commonly cultivated crops, and only to the labour employed on them, leaving questions of rent, manure, interest of capital, &c., to be discussed elsewhere. The crops enumerated are wheat, barley, oats, peas, beans, rye, turnips, wurzel, carrots, cabbage, vetches, rape, flax, clover, pasture land.

It is assumed that reaping and mowing are done by machine, that horse-hoes are used in place of hand-hoes where possible, and that horse, not steam, cultivation is the rule. But the alternatives of hand hoeing and hand reaping on the one hand, and of steam cultivation on the other are suggested and worked out to their results.

1. *Wheat*.—The following are estimates of the labour-cost per acre of this crop under various modes of cultivation.

(a.) After clover :—

	£	s.	d.
Ploughing	0	6	0
Two double harrowings	0	2	2
Drilling seed	0	1	6
Harrowing	0	1	1
Water furrowing, probably	0	1	0
Bird-scaring at seed time	0	1	6
Rolling	0	0	9
Horse-hoeing	0	1	0
Hand-weeding, probably	0	2	0
Bird-scaring before harvest	0	1	6
Cutting corn by machine	0	6	0
Pitching, carrying, building, and thatching	0	4	0
Threshing by steam power (5 qrs.)	0	10	0
Carriage to market (5 qrs.), probably	0	5	0

Cost per acre of labour £2 3 6

Extra :—

	s.	d.
If weed patches need forking out of clover ...	2	0
If reaping be done by hand	4	0
If hoeing be done by hand	3	0
If a dressing of 15 tons of manure be carried on the clover before ploughing—		
Making dung	2	6
Filling	1	6
Carrying	5	0
Spreading	2	0

Total labour-cost per acre 3 3 6

(b.) After bare fallow :—

Cultivation of fallow—three ploughings and six double harrowings	...	...	...	...	...	£	s.	d.
Gathering and removing weeds (perhaps)	...	...	...	...	...	0	5	0
Seed furrow (ploughing)	...	...	...	...	...	0	6	0
One harrowing	...	...	...	...	...	0	1	1
Drilling seed, &c. as in (a.)	...	...	...	...	...	1	15	4
<hr/>								
Add, if reaping and hoeing be done by hand	...	...	...	...	...	3	14	5
						0	7	0
<hr/>								
Labour-cost per acre	...	...	...	...	...	£4	1	5

(c.) After Root crop :—

The same items as in (a.)	...	...	...	...	...	2	3	6
Or if one grubbing be given in place of the ploughing (2s. 6d. in place of 6s.), deduct	...	...	...	...	...	0	3	6
<hr/>								
						2	0	0
Add, if reaping and hoeing be done by hand	...	...	...	...	...	0	7	0
<hr/>								
Labour-cost per acre	...	...	...	...	...	£2	7	0

2. *Barley* :—

Ploughing after the sheep fold	...	...	...	...	...	0	6	0
Two double harrowings	...	...	...	...	...	0	2	2
Drilling seed	...	...	...	...	...	0	1	6
Harrowing	...	...	...	...	...	0	1	1
Rolling	...	...	...	...	...	0	0	8
Bird-scaring	...	...	...	...	...	0	1	6
Cutting by machine, turning, loading, building, thatching	...	...	...	...	...	0	9	0
Threshing (7 qrs.)	...	...	...	...	...	0	10	0
Carriage to market	...	...	...	...	...	0	5	0
<hr/>								
						£1	16	11
Add, if cutting by hook, tying in sheaves, and stooking be adopted	...	...	...	...	1 0	0	3	0
<hr/>								
Total labour-cost per acre of the barley crop	...	...	...	...	...	£1	19	11

3. *Oats*.

(a.) After Clover :—

A good crop will involve an expenditure as nearly as possible like (both in items and in total cost) that of wheat after clover (a.) viz.,	...	...	...	...	...	2	3	6
Or if the weed-forking, hand-reaping, and hand-hoeing be required, add	...	...	...	...	...	0	9	0
<hr/>								
Labour-cost per acre	...	...	...	...	...	£2	12	6

(b.) After Root crop :—

A good crop will involve an expenditure as nearly as possible like (both in items and in total cost) that of	£	s.	d.
barley after roots	1	16	11
Or with additions	0	3	0
Total labour-cost of oats per acre	£1	19	11

4. *Peas.**(a.) After Corn crop :—*

Shallow grubbing stubble	0	2	6
Harrowing	0	1	1
Gathering and burning weeds (probably)	0	3	0
A dressing of 12 tons manure :—	s.	d.	
Making	2	0	
Filling	1	6	
Carrying	4	0	
Spreading	2	0	
Ploughing	0	9	6
Harrowing	0	6	0
Sowing by Suffolk drill	0	1	1
Harrowing	0	1	6
Bird-scaring at seed time	0	1	1
Bird-scaring at seed time	0	1	3
Horse-hoeing	0	1	6
Hand-weeding	0	3	0
Bird-scaring before harvest	0	1	6
Cutting by scythe and harvesting, carrying, building, and thatching	0	8	0
Threshing (5 qrs.)	0	7	6
Carrying to market	0	5	0
Labour-cost per acre	£2	13	6

(b.) Grown for Green Peas :

Cultivation by grubber and hand-weeding, as before ...	0	6	7
Manuring, and ploughing, and harrowing, as before ...	0	16	7
Ribbing, half ploughing	0	3	0
Sowing in the drills	0	1	6
Covering by hand-hoe	0	2	6
Bird-scaring	0	1	0
Horse-hoeing	0	1	6
Hand-hoeing	0	3	0
Earthing up by plough	0	3	0
	£1	18	8

The crop is sold on the ground, and followed by turnip or rape.

(c.) After Root crop :—

Items and cost as in (a.) after the dressing of manure ...	1	17	5
--	---	----	---

5. *Beans.*

(a.) On Corn stubble manured :—

The same as for peas (a.), excepting that the cost of harvesting will be at least 2s. more, for tying in sheaves, &c. £ s. d.
2 15 6

It may be sown by bean-barrow, in the wake of every second plough, but this will not affect the labour-cost.

(b.) After Root crop :—

The same as for peas (c.), excepting that the harvesting will be at least 2s. more for tying in sheaves, &c. I 19 5

(c.) After Clover or Grass :—

The same as (b.)	...	...	...	...	...	I 18 8
Except for digging weeds, add, probably	...	...	2	0		
Extra harrowings required	...	...	1	1		
If dibbled instead of being sown	...	...	5	6		
						<hr/> 0 8 7

Labour-cost of beans per acre £2 7 0

(d.) After Grain crop, and ridged as in turnip culture :—

The same as (a), excepting that the manure being spread in drills, there is the cost of ribbing the land, spreading the dung in drills, sowing the seed by barrow and splitting the intervals to cover it, in place of broadcast- ing the manure and ploughing it under, and har- rowing and sowing by Suffolk drill. Also there is an opportunity of an extra horse-hoeing and moulding up ; the labour-cost will be probably 4s. greater, or 2 17 6

In all cases of manuring the expense of making and applying the manure will vary from 6s. to 10s., and even 15s. per acre, according to quantity, being about 9d. per ton.

6. *Rye.*

(a.) May be sown on a manured Corn stubble :—

Costing, if thoroughly well cultivated, nearly the same as	£ s. d.
peas (a.), or	2 13 6
Deducting for diminished labour, owing to the lighter	
soil on which it is cultivated, probably	2 10 0

(b.) But in general it is grown as a forage crop :—

Costing as peas (a.), up till the brairding of the seed, or	I 7 0
And then, after mowing (2s. 6d.), carried to the feeding	
stalls, say, 8d. per mile, 3s. 6d.	0 6 0
	<hr/>
Labour-cost per acre of rye forage	£1 13 0

7. Turnips.

(a.) After Corn crop:—

	s.	d.
Grubbing	3	6
Harrowing	2	2
Gathering and burning weeds	3	0
Deep ploughing	8	0
Harrowing	1	1
Grubbing	3	6
Harrowing	2	2
Rolling	1	0
Gathering and burning weeds	2	0
Ploughing	6	0
Harrowing	1	1
Rolling	1	0
Ribbing	2	6
Dressing with 18 to 20 tons manure:—	s.	d.
Making	3	6
Filling	2	6
Carriage	3	6
Spreading	2	0
Covering dung	11	6
Sowing	0	9
Two horse-hoes	3	0
Hand-hoeing	4	0
Two horse-hoes	3	0
Hand-hoeing	2	0
Harvesting and pitting	12	0

£3 15 9

(b.) Or in place of grubbing and autumnal cultivation, it may suffice to fork out patches of root weeds, haul on the dung and plough it under in autumn, and be satisfied with grubbing, rolling, harrowing, and sowing on the flat in spring, in which case at least 15s. worth of ploughing, grubbing, harrowing are saved, and the cost will be about

3 0 0

(c.) Or the roots may be consumed on the ground, and the expense of harvesting will be saved, reducing cost to

2 8 0

(d.) If the autumnal ploughing be done by steam, it will be done more efficiently, at a saving of 3s. or 4s., reducing cost to

2 5 0

8. Mangold-Wurzel.

Its labour-cost will be as nearly as possible identical with that of turnips, adding perhaps 2s. per acre to the expense of harvesting what will generally be a heavier crop.

	£	s.	d.
(a.)	3	18	0
(b.)	3	0	0
(c.) Where roots are at once consumed on the land, which is coming to be the practice to some extent	2	8	0
(d.)	2	5	0

If seed is dibbled instead of drilled, the cost will be in every case at least 2s. more than this. The cost of singling will not be altered, but the total cost will then stand thus:—(a.) £4, (b.) £3 2s., (c.) £2 10s., (d.) £2 7s.

9. Carrots and Parsnips:—

These crops may be named together, as costing nearly the same.

	£	s.	d.
The expense before winter, as in the case of the turnips (a.)	0	15	8
Only the manure should have been carted on before the autumn ploughing	0	11	6
Harrowing	0	2	2
Gathering weeds	0	2	0
Sowing	0	1	6
Horse-hoeing	0	1	6
Singling	0	5	0
Horse and hand-hoeing	0	5	0
Harvesting	1	5	0
In all	£3	9	4

10. Cabbages:—

The labour-cost may be the same as for turnips in ridges, up till sowing the seed, viz. (a.)	2	10	0
Afterwards there is the planting 10,000 plants	0	12	0
Two horse-hoeings and one hand-hoeing	0	6	0
Harvesting, probably	0	10	0
In all	£3	18	0

11. Potatoes:—

(a.) By horse-culture, labour up to setting the tubers, as in turnips (a.), up to covering in the dung	2	7	6
Setting tubers (carted to the field)	0	3	6
Covering	0	3	6
Harrowing down	0	1	1
Two horse-hoeings	0	3	0
Hand-hoeing	0	8	0
Earthing up	0	2	6
Digging and harvesting	1	10	0
	£4	19	1

(b.) By hand-culture, labour up to ribbing for receiving the dung, the same as turnips (a.)	1	13	6
Carrying manure and spreading	0	11	6
Digging and planting potatoes	0	14	0
Hacking	0	10	0
Earthing up	0	6	0
Digging and harvesting	1	10	0

Labour-cost of potatoes per acre £5 5 0

12. *Vetches* :—

Sown after a corn crop and manured, will cost in labour, including the drilling of the seed, the same as rye as a forage crop	£	s	d.
And carried home to the feeding stalls, 8s. to 12s., according to crop	1	7	0
	0	10	0
	£1	17	0

13. *Rape*.

(a.) Sown on a Corn stubble :—

Autumn cultivation—manuring and sowing the seed on the flat—will involve nearly the same items of labour as turnips sown on the flat, and consumed on the ground, viz. (c.)	2	8	0
Deduct, however, for three horse-hoeings and one hand-hoeing not needed	0	8	0
Leaving the cost, including one horse-hoeing and a partial hand-hoeing	2	0	0

(b.) Sown after an early crop of Rye and Vetches :—

Two grubblings and harrowings	0	8	2
Dressing of manure (12 tons)	0	9	6
Ploughing and harrowing	0	8	2
Sowing	0	1	6
Horse and hand-hoeing	0	3	6
	£1	10	10

14. *Flax*.

After Root crop :—

Ploughing	0	6	0
Harrowings	0	2	2
Weeding	0	3	0
Ploughing	0	6	0
Harrowing	0	1	1
Scarifying and harrowing	0	4	3
Rolling	0	0	9
Sowing broadcast, by machine	0	0	3
*Weeding, pulling, rippling, and steeping	1	2	0
Taking from steep, spreading, turning, and lifting	1	12	6
Scutching 30 stones	2	0	0
Cleaning seed	0	6	0
Labour-cost of flax	£6	4	0

* These items are stated on the authority of Mr. M'Adam, in his Prize Essay, in vol. viii. *Agricultural Society's Journal*.

If less seed be sown, and a coarser fibre with larger quantity of seed be obtained, the two last items will be somewhat larger.

15. *Clover*.—

	£	s.	d.
(a.) Sowing broadcast on young barley	0	0	3
Rolling and picking stones	0	2	9
Mowing	0	4	0
Making and building, 6s. to 10s., according to weather			
and crop	0	8	0
Carrying	0	2	6
	<hr/>		
	£0	17	6

(b.) When the clover is fed down, the last three items are saved, and the cost per acre is only 3s.

	£	s.	d.	£	s.	d.
(c.) When mown green and carried as forage,	0	8	0			
it may cost for mowing twice	0	8	0			
And carrying green twice	0	8	0			
Or with sowing, &c., probably				1	0	0

16. *Rye Grass*.—

Will cost in labour the same as clover (a.). The labour of sowing it is somewhat greater; that of mowing it may be also somewhat greater. The cost of hay-making will probably be as much = 0 18 0

17. *Pasture Land*.—

Mown every other year, and the stones gathered off it, and rolled; fence mending at intervals, &c., charge per acre per annum = 0 7 6

18. *Attendance on Sheep*.—

Per head per week—less all the year round than 0 0 0½

19. *Attendance on Cattle*.—

	d.	d.
On an average per head, winter feeding per week	7	to 9
Summer, barely	1	
• Average throughout the year, per week	<hr/>	
	0	0 4

Recapitulation.—The following, then, in tabular form, are the results arrived at. The first money column states the labour-cost per acre; the second, third, and fourth state the labour-cost per bushel and per ton on various estimates of crop.

LABOUR-COST OF GRAIN CROPS.

	Per Acre.			Per Bushel.											
				30 Bushels.		40 Bushels.		50 Bushels.		60 Bushels.					
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.			
Wheat, (a.) after clover	2	3	6	0	1	5½	0	1	1	0	0	10½	0	0	9½
„ do. manured	3	3	6	0	2	1½	0	1	7	0	1	3½	0	1	0½
„ (b.) after fallow	3	14	5	0	2	6	0	1	10	0	1	6	0	1	3
„ (c.) after roots	2	0	0	0	1	4	0	1	0	0	0	9½	0	0	8
Barley	1	19	11	0	1	4	0	1	0	0	0	9½	0	0	8
Oats, (a.) after clover	2	3	6	0	1	5½	0	1	1	0	0	10½	0	0	9
„ (b.) after roots	1	16	11	0	1	2½	0	0	11	0	0	8½	0	0	7½
Peas, (a.) after corn	2	13	6	0	1	9½	0	1	4	0	1	1	0	0	10½
„ (b.) green peas	1	18	8	0	1	3½	0	0	11½	0	0	9½	0	0	7½
„ (c.) after roots	1	17	5	0	1	3	0	0	11½	0	0	9	0	0	7½
Beans, (a.) after corn	2	15	6	0	1	10	0	1	4½	0	1	1½	0	0	11½
„ (b.) after roots	1	19	5	0	1	4	0	1	0	0	0	9½	0	0	8
„ (c.) after clover	2	8	0	0	1	7	0	1	2½	0	0	11½	0	0	9½
„ (d.) ridged ...	2	17	6	0	1	11	0	1	5	0	1	2	0	0	11½
Rye	2	10	0	0	1	8	0	1	3	0	1	0	0	0	10

LABOUR-COST OF GREEN CROPS.

	Per Acre.			Per Ton.												
				8 Tons.				12 Tons.				20 Tons.				30 Tons.
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	
Rye (forage)	1	13	0	0	4	1½	0	2	9	0	1	7½	...	...	...
Turnips, (a.) (carried) ...	3	15	9	...	...	...	0	6	3	0	3	9	0	2	6
" (b.) "	3	0	0	...	...	...	0	5	0	0	3	0	0	2	0
" (c.) (fed)	2	8	0	...	...	...	0	4	0	0	2	5	0	1	7
Mangold-wurzel, (a.) (carried)	3	18	0	...	...	...	...	...	...	0	3	10	0	2	7
" " (b.) "	3	0	0	...	...	...	0	5	0	0	3	0	0	2	0
Carrots	3	9	4	...	...	...	0	5	9	0	3	5	0	2	3
Cabbages	3	10	0	...	...	...	0	5	10	0	3	6	0	2	4
Potatoes (a.) (horse culture)	4	19	1	0	12	0	...	...	...	...	...	...	...	...	...
" (b.) (hand culture)	5	3	0	0	12	8*	...	...	...	...	...	...	...	...	...
Vetches	1	15	0	0	4	9	0	3	0	0	1	9	...	...	...
Rape (a.)	2	0	0	0	5	0	0	3	4	0	2	0	0	1	4	
" (b.)	1	10	10	0	8	0	0	2	7	0	1	7	...	...	...
Clover, (a.) (hay)	0	15	6	...	...	...	...	...	...	...	...	...	...	...	...
" (b.) (green)	1	0	0	0	2	6	0	1	8	0	1	1	...	...	...
Rye grass (hay)	0	18	0	...	...	...	...	...	...	...	...	...	...	...	...

Before leaving this section of the book, let us just test the applicability of these figures to the case of a farm or two.

* More likely to be half the weight and double the labour-cost per ton.

(a.) Take that of No. 17, in table 3, p. 57, where 200 acres are cultivated on the four-field course, and where 100 acres are pasture, and where the stock kept may be supposed equal, on an average, to 240 sheep and 30 beasts all the year round. The land is cultivated on the four-field course.

Crops.	Labour-cost per Acre.				Total Labour-cost.			
	£	s.	d.		£	s.	d.	
50 acres wheat or 20 at (a.)	2	3	6	...	43	10	0	
and 30 manured (b.)	3	3	6	...	95	5	0	
50 „ turnips 30 (a.)	3	15	0	...	112	10	0	
20 (c.)	2	8	0	...	48	0	0	
50 „ barley ...	2	0	0	...	100	0	0	
50 „ clover 30 (hay) (a.)	0	15	6	...	23	5	0	
20, cut twice (c.)	1	0	0	...	20	0	0	
* Sundry labour on carriage of materials, fencing, roads, &c., on 300 acres, viz. ...				...	50	0	0
<i>Attendance on Stock:—</i>								
240 sheep at ¼d. weekly each	...	...	...	...	26	0	0
30 beasts at 4d. ditto	...	...	...	...	26	0	0
100 acres of pasture at 5s. an acre	...	...	...	...	25	0	0
				£569 10 0				

This sum pays for horse labour as well as wages. Deduct the cost of the horse labour, except wages paid to team men = 184*l.* (see No. 17, p. 57), and you have for wages 410*l.*, which is equal to 38*s.* an acre on the arable land, and 6*s.* an acre on the pasture, and this is probably near what is actually paid.

(b.) Take the case of a Nottinghamshire light land farm, No. 1, on p. 2. The cropping, according to the accounts received, must be nearly as follows on 930 acres:—

Labour-cost.				Total.				
Per annum.								
			£	s.	d.	£	s.	d.
100 acres in wheat at	...	(a.)	3	3	6	317	10	0
100 acres in oats at	...	(a.)	2	3	6	217	10	0
150 acres in barley at	...	...	2	0	0	300	0	0
20 in peas at	...	(a.)	2	13	6	53	10	0
210 acres in wurzel and turnips	{ 110 (a.)	3	18	0	429	0	0	
	{ 100 (c.)	2	8	0	240	0	0	
350 acres in clover	{ 100 mown	...	0	15	6	77	10	0
	{ 100 do. twice	...	1	0	0	100	0	0
	{ 150 fed	...	0	5	0	37	10	0
Sundry labour, as carriage of material, mending roads, fences, &c. (900 acres)						* 120	0	0
Attendance on live stock, probably 1,200 sheep, ¼d. each per week						130	0	0
Total labour-cost						£2,022	10	0

* This item may be fairly put as high, seeing that it includes a number of items hardly

This includes cost of horse labour (see No. 30, p. 57, and deducting 608*l.*, viz. 956*l.* except wages of team men 348*l.*, you have a total paid in wages of about 1400*l.* Now the wages actually paid on that farm are 1383*l.*, which is a sufficient confirmation of the justice of our valuation.

VI. CALENDAR OF FARM LABOUR.

In this, the last section of the book, it is proposed to enumerate the labours of the several months, and estimate the quantity in each, taking the case of a farm of 300 acres, 60 of which are in permanent pasture, mown every other year, and the remainder of the farm is arable land, cultivated on an eight years' course of cropping, thus:—1. Wheat (30 acres).—2. Winter beans (10 acres), carrots (10 acres), potatoes (10 acres).—3. Wheat (30 acres).—4. Turnips (10 acres), swedes (20 acres).—5. Barley (30 acres).—6. Clover (30 acres).—7. Wheat (30 acres).—8. Mangold-wurzel (30 acres). Of the green crops, the carrots, potatoes, mangold-wurzel, and half of the turnips and swedes, and half of the clover, are carried home to the yard, there to be consumed by cattle, sheep, and pigs. All the green crops and the winter beans are manured; and as much of the manuring as possible is done in the autumn.

The calculations at the end of the calendar will relate to the circumstances of this farm, but the summary of operations named under the several months will relate to agriculture generally.

27. Monthly Operations of the Farm.—*January.*
Drainage operations; carriage of manure to heaps in fields, also of lime and marl, also of grain to market; threshing grain for sale; ploughing, probably the last of the stubbles for root crops; applying clay and marl, carrying lime, &c.; attendance on cattle and sheep; road and fence mending; top-dressing pastures.

February.—Preparing for and sowing spring wheat, beans, and peas towards the end of the month; continuance of all works of carriage, viz. manures, lime, &c.; purchase of manure and seeds, and carriage home; marketing of grain and fat stock; attendance on feeding and breeding cattle, sheep, and swine; gathering stones off the meadows which are to be mown.

capable of enumeration, such as carrying corn and coal and manure from market for consumption on the farm; also lime for application at intervals of years; also every unusual expense owing to weather; also repairs of roads and fences, &c.

March.—Finishing sowing wheat, pease, beans; preparation of land for and sowing oats, barley, carrots, grass, clover, vetches; potato cultivation and planting; preparation of land for mangold-wurzel, turnips, cabbage, flax; turning manure heaps in the field and yard, for use in the cabbage or mangold-wurzel fields; threshing, if necessary, for marketing or for straw; attendance on fattening and breeding stock of all kinds; marketing; mowing-fields to be cleaned, harrowed, rolled, and shut up.

April.—Finishing sowing oats, barley, carrots, grass, and clover seeds; also potato planting, and, if possible, mangold-wurzel sowing; sowing sainfoin, vetches, flax; cleaning out yard and carrying to field all the manure for turnip fields; horse-hoeing wheat, and possibly beans and peas; attendance on breeding and feeding stock of all kinds.

May.—Finishing sowing of mangold-wurzel; transplanting cabbage; preparation of land for turnips; horse and hand-hoeing grain crops; also carrots and parsnips and early-planted potatoes; cutting and carrying green rye and vetches. Cattle fed in houses or turned out to pasture; sheep in pastures; sheep-shearing.

June.—Sowing turnips; horse and hand-hoeing mangold-wurzel, carrots, parsnips, beans, cabbages, potatoes; preparing land still for turnips, rape, &c. Attendance on cattle and sheep in pastures; sheep-shearing; haymaking.

July.—A last horse-hoeing of carrots and parsnips; finishing sowing turnips as a main crop; sowing rape and mustard; mowing clovers and meadows; haymaking; harvesting peas and winter beans; ploughing and sowing turnips and rape, after rye and vetches; pulling flax when ripe enough; horse and hand-hoeing turnips and mangold-wurzel; carriage of tiles, road material, &c., for autumn and winter use; also of lime for use on either clover or corn stubble.

August.—Wheat, barley, oat, bean harvest; finishing haymaking; horse-hoeing turnips and mangold-wurzel; ploughing and scarifying stubbles; finishing sowing turnip and rape after vetches or corn crop.

September.—Corn harvest; autumn cultivation; ploughing clovers (after in some cases carrying manure on them) for wheat; sowing trifolium on corn stubbles.

October.—Finishing corn harvest; preparation for and sowing wheat, rye, winter beans, winter vetches; harvesting potatoes, swedes, and mangold-wurzel; autumn cultivation of stubbles; carrying and application of lime, also of manure, on fields for root crops. Folding sheep on turnips.

November.—Wheat sowing ; finishing harvesting swedes, mangold-wurzel, carrots, potatoes ; continuing to carry manure on to stubbles and ploughing them in ; also ploughing clover and grass lands for oats ; threshing grain for market and for straw. Attendance on cattle in stalls, and sheep on turnips in the field. Road mending, draining, chalking, marling.

December.—Wheat sowing in favourable weather. Continuing ploughing stubbles, and finishing ploughing lea for oats ; threshing and marketing ; carriage of manure to field. Attendance on fattening stock in stalls, yards, and fields.

28. Estimated Labour of the Farm.—The following is the estimate referred to in the opening paragraph of the previous section. First, as regards horse labour :—

NO. 1.—WHEAT AFTER MANGOLD-WURZEL, 30 ACRES.

The kind of work required for a crop of Wheat.	The months when the work should be done.	Days' work of a man and two horses.
To gathering and carting off mangold leaves	November.	5
„ ploughing the land after the roots are off	Nov. and Dec.	30
„ harrowing the land a double time ...	December.	6
„ drilling the seed	„	3
„ harrowing the land a double time ...	„	6
„ carriage of crop	August.	6

This crop of wheat requires six days of two horses in August, twenty days of two horses in November, and 35 days' work of two horses in December.

NO. 2.—30 ACRES ; 10 ACRES TO BE IN WINTER BEANS.

The kind of labour required for Beans.	The months to do the work.	Days' work of a man and two horses.
To cultivating the land twice across each other	August.	9
„ two double turns of the harrow	„	4
„ carting 200 loads of manure	September.	4
„ ploughing the land	„	10
„ two double turns of the harrow	„	4
„ drilling the beans	„	2
„ horse-hoeing twice	April.	2
„ earthing up	May.	2
„ carrying crop	July.	3

These ten acres of No. 2 require thirteen days' work of two horses in August, twenty days in September, two days in April, two days in May, and three days in July.

NO. 2.—10 ACRES IN CARROTS.

The kind of work required for Carrots.	Time when the work should be done.	Days' work of a man and two horses.
To carting 250 loads of manure	October.	4
„ ploughing in the manure 8 inches deep	„	10
„ cultivating twice across	March.	4
„ harrowing two double times	„	4
„ rolling and drilling	April.	3
„ horse-hoeing	June and July.	3
„ carriage of crop	October.	3

This crop of ten acres requires eighteen days' work of a pair of horses in October, and eight days in March, three days in April, one day in June, and two days in July.

NO. 2.—10 ACRES IN POTATOES.

The kind of work required for Potatoes.	Time when the work should be done.	Days' work of a man and two horses.
To carting 250 loads of manure	September.	4
„ ploughing in the manure deep	„	10
„ ploughing the land the second time	February.	10
„ harrowing a double time	April.	2
„ cultivating twice across	„	5
„ harrowing double time	„	2
„ drilling for and covering the potatoes	„	6
„ horse-hoeing twice	May.	2
„ moulding up the potatoes	June.	3
„ carting off produce	October.	2

This crop requires fifteen days' work in September, ten days in February, fifteen days in April, two days in May, three days in June, and two days in October.

In all, No. 2 requires ten days' work in February, eight days' work in March, twenty days in April, four days in May, four days in June, thirteen days in August, thirty-five days in September, and twenty days in October.

NO. 3.—30 ACRES IN WHEAT.

The kind of work required for Wheat.	The months when the work should be done.	Days' work of a man and two horses.
Clearing up land	October.	5
To ploughing the land after the roots are off	Oct., Nov., Dec.	30
„ a double turn of the harrow	December.	6
„ drilling the seed	„	3
„ a double turn of the harrow	„	6
„ carriage of crop	August.	6

This crop of wheat requires twenty days' work of a pair of horses in October, fourteen or fifteen days in November, eighteen or nineteen days in December, and six days in the following August.

NO. 4.—30 ACRES TURNIPS AND SWEDES.

The kind of horse labour required for Turnips.	The months when the work should be done.	Days' work of a man and two horses.
To ploughing	Nov. and Dec.	30
„ carting 450 loads of manure	Feb. and March.	9 } 39
„ ploughing in the manure	April and May.	30 }
„ double turn of harrow	May.	6
„ cultivating the ground with three horses ...	„	9 } 15
„ double turn of the heavy harrow	„	6 }
„ rolling and harrowing	{ May.	6
„ carting 300 loads of short prepared dung	{ June.	6
„ cultivating deep to mix the dung on the surface	„	6 }
„ a double turn of the harrow	„	9 } 33
„ rolling	„	6 }
„ ribbing	„	2 }
„ horse-hoeing swedes	„	10 }
„ carrying off half the crop	July and August.	18
	Oct. and Nov.	10

This is four days in February, five days in March, five days in April, forty-six days in May, thirty-nine days in June, nine days in July, nine days in August, five days in October, twenty days in November, fifteen in December; in all, 157 days.

NO. 5.—30 ACRES IN BARLEY.

The kind of horse labour required.	The time when the work must be done.	Days' work of a man and pair of horses.
To ploughing the land with a shallow furrow	Jan. and March.	30
„ a double turn of the harrow	March.	6
„ drilling the seed	April.	3
„ a double turn of the harrow	„	6
„ carrying the crop	August and Sept.	6

This field requires fifteen days of two horses in January, twenty-one days in March, nine days in April, three days in August, and three days in September.

NO. 6.—30 ACRES IN CLOVER.

The kind of work required for the Clover crop.	The time when the work should be done.	Days' work of a man and two horses.
To be rolled	April.	2
One half to be mown and carried as hay	July.	3
To be mown and carried green	June, July, Aug., and September.	12

This crop requires the labour of a pair of horses two days in April, three days in June, eight days in July, two days in August, and two days in September.

NO. 7.—30 ACRES IN WHEAT.

The kind of work required for a crop of Wheat.	The months when the work should be done.	Days' work of a man and two horses.
To ploughing	September.	30
„ harrowing it three double times	Sept. and Oct.	18
„ drilling the seed	October.	3
„ harrowing the land after the seed a double time	„	6
„ carrying the crop	August.	6

This crop requires six days' work of two horses in August,

thirty-seven days' work of two horses in September, and twenty days in October.

NO. 8.—30 ACRES IN MANGOLD-WURZEL.

The kind of work required for Mangold-Wurzel.	The time to do the work.	Days' work of a man and two horses.
To ploughing first time	Oct. 10, Nov. 10, Dec. 5, Jan. 5.	30
„ harrowing double time	February.	6
„ carting 450 loads manure	Feb. 10, „ Mar. 20.	9
„ ploughing in dressing	March.	30
„ cultivating	April.	9
„ harrowing twice	„	12
„ carting 300 loads that day	„	6
„ cultivating and harrowing	„	15
„ ribbing land for sowing	April and May.	9
„ horse-hoeing four times	May 6, June 6, July 6.	18
„ carrying off crop	Oct. and Nov.	20

This crop thus needs fifteen days' work of a man and two horses in October, twenty-five days in November, five days in December, five days in January, twenty-five days in February, twenty-nine days in March, thirty-seven days in April, eleven days in May, six days in June, and six days in July.

The following table then gives the results of the horse labour ascertained above, and distributed through the months :—

MONTHS OF THE YEAR.

No. of Crop.	Acres.	January. Days.	February. Days.	March. Days.	April. Days.	May. Days.	June. Days.	July. Days.	August. Days.	September. Days.	October. Days.	November. Days.	December. Days.
1. Wheat	30	...	...	...	...	...	...	...	6	...	...	20	35
2. Carrots	10	...	...	8	3	...	1	2	...	...	18	...	...
Beans	10	...	...	...	2	2	...	3	13	20	...	...	...
Potatoes	10	...	10	...	15	2	3	...	...	15	2	...	...
3. Wheat	30	...	...	...	...	...	...	...	6	...	...	20	16
4. Turnips	10 }	...	...	...	...	...	...	...	...	...	...	...	...
Swedes	20 }	...	4	5	5	46	39	9	9	...	5	20	15
5. Barley	30	15	...	21	9	...	...	...	3	3	...	...	...
6. Clover	30	...	...	...	2	...	...	3	8	2	...	...	...
7. Wheat	30	...	...	...	...	...	...	...	6	37	20	...	...
8. Mangold-wurzel	30	5	25	20	37	11	6	6	...	...	15	25	5
Total ... ..	...	20	39	63	73	61	52	28	45	77	80	79	71

688 days of a man and pair of horses are, according to this table, all that this farm of 240 acres of arable land requires for its annual cultivation. But there are sixty acres of pasture besides, which involve considerable labour in dressing with manure during winter, and carrying hay in July; for this the distribution of the arable labour gives ample means during January and July, when the horses are not fully employed. And there is also a considerable quantity of cartage in marketing, and in carriage of manures and seeds, and food for cattle, of which no account is taken in the table. Taking, however, the monthly figures there given to be pretty nearly accurate, we find that the greatest provision of horses for the labour of the farm must be in March, April, May, September, October, November, and December. If we take October as the month of greatest labour throughout the year, we find that eighty days of a team are needed, and as only twenty-two or twenty-three days fit for field work can be expected during that month, three and a half teams must be provided, or seven horses, three men, and a lad; and these must be maintained and paid throughout the year, notwithstanding that it is only during a few months that they are all needed. It is in the power of steam cultivation to reduce the demands made by the autumn cultivation and spring ploughing on the horse power of the farm; and, by its assistance at these two periods to reduce the number of horses needed throughout the year.

The next table gives an estimate of the cost of hand labour employed upon the crops in the different months of the year: the wages for man, woman, and child being taken at an ordinary amount, and the operations whose cost has been accounted for, including filling and spreading manure, hand-hoeing and weed-gathering, reaping and mowing corn and grass, haymaking, and harvesting grain crops and green crops, threshing the former, and consuming the latter. The table gives in shillings the sum paid per acre in this way in the several months.

A detailed examination of the figures in this table will not be attempted; but the figures in one case may be explained in illustration of the whole. Take that of the wheat crop No. 1:—“During the months of winter and spring, about 5s. per acre, in all, are spent in labour on threshing; during November and December, 1s. or 1s. 6d. an acre (or say three weeks of a boy for a ten-acre field) are spent in scaring birds at seed time, and the same is needed before harvest in July; 3s. and 4s. an acre are needed in April, May, and June, for hoeing and weeding the

young crop; and 10s. or 12s. an acre are needed in August and September for cutting, carrying, staking, and threshing the crop. A root crop might be taken, and the figures in its case similarly justified. The only point, however, there requiring explanation is the charge of 6s. or 8s. a month during the winter months on account of them, which includes all the labour of managing manure for those crops, and of attendance on the live stock fed upon them.

Crop.	Average.	Number of Shillings per Acre Monthly.												Total Cost.	
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Per Acre.	Of Crop.
1. Wheat...	30	1	1	1	2	2	1	1½	6	6	...	1½	2	£ s. d.	£ s. d.
2. Beans ...	10	1	1	...	2	3	3	8	2	2	3	1	1	1 5 0	37 10 0
Carrots	10	2	2	2	5	...	5	3	...	...	20	10	2	2 11 0	25 10 0
Potatoes	10	...	...	...	10	4	8	...	...	8	30	...	...	3 0 0	30 0 0
3. Wheat...	30	1	1	1	2	2	...	1½	6	6	...	3	1	1 4 6	36 15 0
4. Turnips	10½	8	8	7	2	4	4	6	1	...	2	8	8	2 18 0	87 0 0
Swedes	20½	1	1	3	2	...	...	1½	6	6	...	...	...	1 1 6	32 5 0
5. Barley...	30	...	...	1	1	...	2	4	4	2	2	...	...	0 16 0	24 0 0
6. Clover ...	30	1	1	1	2	2	1	1½	6	6	...	2½	1	1 5 0	37 10 0
7. Wheat...	30	...	...	...	...	...	...	...	...	...	...	...	...	...	...
8. Mangold-wurzel	30	8	8	8	8	8	4	2	...	...	7	7	6	3 6 0	99 0 0
Total ...	240	630	630	680	740	610	520	650	890	880	860	770	600		423 0 0

From this table it would seem that the constant staff upon the farm, besides the team men, should be equal in point of wages to about £30 a month, and that extra labour, worth something like £15 or £20 a month, will be needed during the season of corn and root harvest. These wages will not, however, represent so many additional hands, because the extra work will be let to the constant hands of the farm as far as possible, and they will earn their extra wages by extra labour during extra hours.

The total wages = £423, must be increased by the labour on sixty acres of pasture land, costing about £15, and by the wages of the team men, or £117 (see No. 6, p. 57); perhaps also by something for shepherd and cowman, for although a charge has been made per acre on the roots for winter preparation and consumption, yet this expense will hardly have been covered. Let

us then put the whole wages of the farm at £540, or £560, and this will amount to 50s. an acre on the arable land, or somewhat less than this if 5s. an acre be first deducted for the permanent pasture of the farm.

The horse labour table, again, will correspond nearly in its results with farm No. 6, on page 57.

Let me add here, that if on comparing the figures in these tables with those given under the several crops in Section V., discrepancies be found to exist—as may very probably be the case, for they have not been founded on one another—an explanation may to some extent be found in the fact, that the cost of shepherding and cattle feeding is here almost or entirely included in the acreable charges on the several crops.

In conclusion, I give, as bearing on the subject, an extract from a paper read ten years ago before the London Farmers' Club, by the late Robert Baker, of Writtle, in which the cost of horse power and of wages on arable land, is stated as actually experienced by the writer.

The cultivation of the farm from 1835 to 1850 included the the following particulars:—

—	Crops.	Cultivation.					Manure.			
		Ploughing.	Scarifying.	Harrowing.	Drillings.	Rollings.	Manure.	Clay and Chalk.	Guano.	Soot.
							Tons.	Tons.		Bush.
1839	Wheat	2	1	4	1	1	...	...	...	...
1840	{ Rye, and Tares, and Swedes } drawn	5	3	8	2	3	16	40	...	...
1841	Barley	1	1	4	1	2	...	...	...	...
1842	{ Early Peas, Turnips, fed and } drawn	4	2	4	1	1	20	{ Earth & Lime. }	...	40
1843	White Oats	2	...	4	1	2	...	20	...	...
1844	Wheat	1	...	4	1	1	10	...	...	...
1845	{ Rye, and Rye and Tares, mown } green, Swedish Turnips ...	5	1	6	2	3	16	...	2	30
1846	Barley	2	2	4	1	2	...	...	2	...
1847	Red Clover, twice mown ...	...	...	...	...	...	...	...	...	...
1848	Wheat	1	2	4	1	1	12	...	...	...
1849	Barley	3	1	5	1	2	6	...	...	...
1850	Green crop	3	...	...	...	...	...	...	...	...
		29	13	47	12	18	80	60	4	70

The following was the manual labour and general expenditure per acre :—

MANUAL LABOUR AND GENERAL EXPENDITURE PER ACRE.				
Harvesting Wheat and Barley, 15s., six times	...	...	£4	10 0
„ oats once	...	...	0	14 0
Cutting Clover, Rye, and Tares, and carting, 10s.	...	...	1	10 0
Pulling and carting Turnips, three times, 24s.	...	...	3	12 0
Threshing and carting 12 qrs. Wheat, 4s. 3d.	...	...	2	11 0
„ 18 qrs. Barley, 3s.	...	...	2	14 0
„ 7 qrs. Oats, 2s. 3d.	...	...	0	15 9
Tying and marketing straw	...	...	2	10 0
				10) 18 16 9
Wages per acre per annum	...	...	£1	17 8

It is plain, however, that there is an omission here of all charges connected with the consumption of the crop and management of live stock, which would raise the cost to something more nearly £2 an acre. To this must be added the wages of team men, probably nearly 10s. an acre, as in the case already examined; so that Mr. Baker's figures are found to agree closely with our own. The wages of team men are included in the cost of horse labour specified in the next table.

CULTIVATION BY HORSES.				
2½ Ploughings, 8s. averaging annually	...	...	£1	0 0
1½ Scarifyings, 3s.	...	...	0	3 9
4½ Harrowings, 9d.	...	...	0	3 6
1½ Drilling, 3s.	...	...	0	1 9
1½ Rolling, 1s. 1d.	...	...	0	1 6
Striking furrows; water-furrowing	...	...	0	1 0
Hoing	...	...	0	2 0
Sowing soot and guano and carting manure	...	...	0	3 3
Average annual cost of horse labour per acre	...	...	£1	18 6

These figures, coming from so great an authority as Mr. Baker, are a sufficient corroboration of the results to which the reader has been already led.

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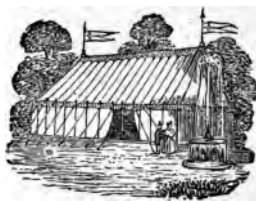
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